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### Listerian Oration.

#### LISTER AS PHYSIOLOGIST.<sup>1</sup>

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It is scarcely necessary for me to assure you how much I appreciate being selected to give an oration bearing the name of Lister, and I am further gratified by the fact that my predecessors have occupied so high a position in the profession.

My own contact with Lister was very slight, but what little there was I may perhaps be permitted to give. In January, 1897, when I was a medical

graduate of one and a half years' standing, Lister arrived in Belfast shortly after his elevation to the peerage and formally opened some new laboratories in physiology and pathology. I was demonstrator in physiology at the time and was presented to the great man. On the evening of the twentieth of this same January, Professor Johnson Symington, a former pupil of Lister, entertained the distinguished visitor at a "symposium" held in the anatomy department. The leading practitioners were invited, as also were many prominent representatives of other professions, including the church. The word symposium was new to us in such a connexion, and none of the guests, I imagine, had any idea what was to be the procedure. However, Professor Symington, with hospitable intent, had the room filled with rough undecorated tables on trestles, carrying a most ample assortment of intoxicating beverages. These were well patronized, and it was said afterwards that more reputations were lost that

<sup>1</sup> Abridged from the Listerian Oration delivered at a meeting of the South Australian Branch of the British Medical Association on May 30, 1935.

evening than ever before in the history of the city. But there was something even more startling. Our host, to brighten proceedings, had engaged a couple of "music hall artists" to render some comic items. Now in the Calvinistic city of Belfast, in which Symington was rather a newcomer, the music hall attracted only the dregs of the population, and the entertainment was chosen to match. Never can I forget the sensation when these vulgarians started on their obscene patter and lewd songs. Dignitaries of the church assumed a frigid solemnity, and staid consultants looked down their noses. I thought at the time of Captain Costigan breaking out into his bawdy song in the presence of Colonel Newcome. However, "the papers hid it handsome" and no public protest arose. In the course of the speech of welcome, Symington, who neither suggested nor assumed polish of manner, rather tactlessly asserted that their guest would be just as welcome if he were plain Joe Lister. My recollection of Lister's reply does not tally with the account given by Sir Rickman Godlee in his authoritative biography of his uncle. According to Godlee, Lister "said that if he had known beforehand that he was to receive such a distinction as the peerage he should probably have declined it, unless possibly he could have ascertained before accepting it that the members of his profession would have approved of it". My memory, but I admit that it may not be correct, considering the distractions of the evening, is that Lister described himself as accepting the honour because it was extended to the profession as well as to himself; otherwise he would probably have refused.

Four years later I was fellow guest of the great man during a short yachting cruise. He was then elderly and distinguished, and I was precisely the reverse in both respects, but he spoke very kindly to me and, if anything was passed round for inspection, would personally hand it over with a courteous gesture. A young biologist showed some trawling apparatus in action and brought up a number of large sea urchins which were filled with ova. It was explained that they were quite good eating raw. Lister smiled a little wryly and waggishly asked me would I demonstrate their dietetic quality. Here was a chance to distinguish myself, but I gave one glance at the speckled entrails and another at the Clyde estuary, which resembled the Mersey in that its quality was not strained, and I declined the test.

Shortly after this I went into lodgings in Regent's Park, curiously enough in a house where Huxley had resided; and one morning, as I walked to University College in Gower Street, I met the great man having a constitutional. I did not expect to be recognized, but he stopped me with a smile and recalled the sea urchin episode. Then followed some kindly inquiries about my work and prospects. Day after day I met him in this way; sometimes there was a far-off look in his eyes and he passed me by, but often he would stop me with that delightful smile and let me talk about the physiological research going on in University College, "his old

college" he would often say. He would also tell me about his own original investigations in this field. It is a matter of constant regret to me now that I had not at the time the judgement and perspicacity to perceive how great a physiologist Lister was. Young and full of admiration of the then present, and dazzled by the brilliance of the research conducted in University College in chemistry, physiology and other sciences, I regarded Lister as an old man dreaming about old things, and I remember my surprise when my friend Benjamin Moore, some years senior to me, referred to Lister's exceptional knowledge of physiological principles, and to the soundness of his views, and how neat his experimentation had been. Recognition of this came, alas, too late for me to express in person, but, looking back on our conversations, I realize now how correct Benjamin Moore was in his estimate. At this time Lord Lister was not continuously resident in the metropolis, but when he came to his house in Park Crescent he never missed his morning constitutional, unless the weather was foggy or inclement, and it so happened that his hour for that leisurely exercise corresponded with my journey on foot to my work in Gower Street. I cannot, unfortunately, recollect the detail of the topics discussed, but the impression I now have, after study of his published works, is that he must have conducted more physiological experiments than he described in print. I dwell upon this aspect of Lister because I find an impression rather widespread that Lister was a clinician pure and simple. Now the famous paper which introduced the antiseptic system into surgery was published in 1867; but before this Lister had conducted a series of investigations in physiology and experimental pathology which attracted much favourable attention; he was elected Fellow of the Royal Society in 1860 on the strength of these investigations, and in 1863 was chosen to deliver the Croonian Lecture to that august body, an honour conferred only upon those whose original contributions to science have signal merit. All this before the idea of antiseptics had come into being. When at last Lister approached the field of work which was to bring renown to his name and race, he entered with all the armamentarium of a competent physiologist. Let us hear his own words: "As a student at University College I was greatly attracted by Dr. Sharpey's lectures, which inspired me with a love of physiology that has never left me." (*The British Medical Journal*, October 6, 1900, also "Collected Papers", Volume II, page 515.)

My purpose is to direct your attention to this aspect of Lister's activities for, by the very brilliance of his subsequent achievement, these labours are apt to be overlooked. A study of "Lister as a Physiologist" has been given by the late Sir Edward Sharpey-Schafer in the Centenary Volume (1927), and a valuable analysis it certainly is, but there are some curious omissions and a few slips which I can explain only on the supposition that Sir Edward's otherwise excellent memory was beginning to show signs of age. I think, too, that Schafer, who was obsessed with the use of smoked-paper records,

was inclined to undervalue any investigation in which these were not extensively employed, forgetting that Langley unravelled the architecture of the autonomic system and explored most of its functions by experiments which did not employ recording instruments. Like Huxley and many young researchers in physiology in that period, Lister was attracted first of all by histology. His father had invented a greatly improved microscope, so that there was a constant stimulus in the home. These early researches are by no means 'prentice efforts. He attacked the problem of smooth muscle in the iris, skin and walls of the small intestine. His drawings of the spirally wound fibres of smooth muscle enveloping the arterial wall could not be improved upon, and we need not wonder that they aroused admiration throughout the world. But, like a true physiologist, he could be content with morphology for a short time only. He now embarked on an investigation which we can honour today as a great contribution to pathology, for so pathologists have described his account of the changes in the circulation during inflammation. It was a model of experimentation, careful observation and sound reasoning. There is very little to add to it today. His next investigation was the mechanism of transport of the chyle in the abdominal lymphatics. Chloroformed mice were used, and the outcome of the experiments was the conclusion that the only force was the *vis a tergo* due to absorption by the villi. Schafer has quite legitimately pointed out that the chloroform might easily have abolished rhythmic movements of the lacteals. With another experiment (1857) he was on surer ground. Indigo was mixed with bread and milk and the absorption in the small intestine was studied. No indigo passed into the lacteals, thus discountenancing the current hypothesis that the villi could take up solid matter. A similar experiment was repeated some forty years afterwards by a German physiologist, who showed that when a mixture of paraffin and fat was emulsified and given as food, the fat was quantitatively absorbed, whereas the paraffin was quantitatively refused admittance. In modern parlance, fat must be digested by lipase and the product dissolved with the aid of bile before absorption can take place.

The mechanism responsible for the contraction and dilatation of arterioles now occupied his attention, and he came to the conclusion that control is exercised by the spinal cord and "posterior part of the brain". There is a tendency today to place the entire vasomotor regulation in the medulla and to neglect the cord. I remember well my own surprise on finding in a dog with spinal transection that the distal fragment could carry out vasomotor reflexes. According to Lister, a limb completely removed from all cerebro-spinal influence, say by amputation, can display activity of smooth muscle in its arteries. He therefore demonstrated that arteries can survive a long time after isolation and, further, that there was some mechanism of coordinated contraction independent of the central nervous system.

At the very same time when he was busy with these researches his restless energy was directed to another problem, the movement of pigment granules in the frog's skin under nervous influence. Again we find delightful ingenuity and simplicity in the experimentation. It was something quite novel to assert that the granules were inside living cells and moved towards or away from the nucleus under nervous direction and so could give change of colour; but the demonstration was complete.

In his next research he was not so happy, for, as Schafer points out, he began with a preconceived hypothesis, contrary to his usual procedure. Starting from the unchallengeable fact that weak stimulation and strong stimulation applied to nerves have often opposite effects, he believed that inhibition was due to over-stimulation of effector nerves. A clear disproof of this hypothesis would be given if on cutting the vagi the heart was quickened. So he cut the vagi in some rabbits and found to his delight that there was no acceleration. Schafer comments on this as follows: "Why these experiments should have given a negative result it is not easy to say, for the positive result is constantly obtained in mammals." This is a curious piece of criticism, for Sir Edward Schafer must have known perfectly well that normally in the rabbit there is no vagotonia and that cutting of the vagi is therefore not followed by cardiac acceleration. During the course of this inquiry Lister discovered evidence to allow him to state that: "The intestine possesses an intrinsic ganglionic apparatus which is essential to the peristaltic movements and which, capable of independent action, is liable to be stimulated or checked by other parts of the nervous system." This is precisely current doctrine today.

Lister's next excursion was into a territory which has proved the grave of many a reputation, namely, the cause of the coagulation of the blood. Here let me parenthetically remark how much of the time and energy of a good investigator is often spent in refuting erroneous conceptions. Such refutation makes uninteresting reading subsequently and adds little to the author's fame. Now at the time the prevailing idea was that coagulation of the blood was caused by escape of ammonia. This ridiculous suggestion was put forward by Dr. Benjamin Ward Richardson, who, through personality and some undoubted gifts, was able to command the support of his colleagues and the whole-hearted admiration of the public. When Dr. Richardson proclaimed that stone fruits were unwholesome, the bottom fell out of the plum market; when he asserted that man's body changed its material structure every seven years, this utterly unproved and unprovable contention was accepted as gospel by medical practitioners, by clergymen and by the man in the street. Thus it came about that Dr. Richardson was awarded the Astley Cooper Prize of the Royal College of Surgeons of England (1857) for the ammonia hypothesis of blood coagulation, founded on very faulty experimentation. When Lister dealt with Dr. Richardson (1838-1863) he left not



a wreck behind, and incidentally gave physiology the beautiful experiment of the "living test-tube"—the jugular vein of the ox, which will hold blood coagulated for a long time. He showed that injury to the internal coat of the vessel, also foreign matter, started coagulation, which, with remarkable prescience, he pronounced "catalytic" (Croonian Lectures, 1863). If Lister did not unravel the secret of coagulation, it may yet be fairly stated that he went as far as any other investigator who has attacked that baffling problem.

The mechanisms operative in the circulation next came in for experimental analysis. Arterial blood escaping from a small orifice was made to write its own pressure-graph on a moving sheet of paper. Lister did not know that this had already been done, though in a much clumsier manner, but he deserves credit for an experiment which proves conclusively that the waves on the sphygmogram are not instrumental in origin. Schafer makes the curious criticism that Lister had not allowed for the changes in velocity of the moving blood. If Schafer had ever carried out the experiment of measuring the speed of travel of blood in an artery, it is difficult to see how he could have put his name to this comment. I find with my classes that the ocular demonstration of the sluggish flow comes always as a surprise to students. It may be disregarded altogether in the experiment of Lister, though it may have had some slight influence in the previous experiment of Landois.

I now come to two remarkable conclusions on the dynamics of the circulation, one of which Schafer dismisses in some dozen words, whilst the other he ignores.

In 1873 I was one day illustrating this subject to my clinical class in Edinburgh by raising one of my hands to the utmost while the other was kept dependent, in order to exhibit the contrast between them in redness, when a sensation of chilliness coming on in the hand that was raised made me feel, and at once express, the conviction that something more was occurring than could be explained by the mere mechanical effect of the position of the part upon the blood in the vessels, and that the diminution of pressure upon their walls resulting from the action of gravity upon their contained blood must operate as a stimulus to the vasomotor nervous apparatus of the limb, so as to induce reflex contraction of its arteries. I will now ask this man (with his arms bare) to raise one hand high into the air while the other hangs beside him. You observe at once the striking contrast between the two. In the one elevated, not only have the veins entirely collapsed, but the colour is almost that of the limb of a corpse. So white is the hand as to imply that the minute arteries must surely be in the same state of extreme constriction as occurs during syncope.

Esmarch had made a limb bloodless by bandaging and then applying a tourniquet; Lister exsanguinated the limb by raising it up and was convinced that something more than gravity was operative.

Being desirous of testing with greater precision than was possible upon the human subject the correctness of the view which I had been led to entertain of the cause of the paleness of an elevated limb, I performed on November 29, 1873, the following experiment upon a horse. An arrangement having been made by means of ropes and pulleys, one rope being connected with a broad sling

beneath the abdomen and others with the feet, so that the animal could be either raised into the air with the feet dependent, or laid on its side on the ground with the legs extended horizontally, or again placed on its back with the feet drawn vertically upwards, chloroform being administered, I exposed, at the lower part of one of the forelegs, an artery about as large as the human vertebral, situated along the outer aspect of the metacarpal bone.

In the elevated position of the limb the wound proved almost absolutely bloodless, closely resembling one in a dead animal; and the artery was straight and pallid, and no pulsation could be perceived in it. When the animal was turned round so that the feet were dependent, the artery became much increased in size, tortuous, red, and pulsating powerfully, and blood oozed freely from the surface of the wound; and when the limbs were placed horizontally an intermediate condition took place, both as regards the artery and the hemorrhage.

The following simple but beautiful experiment was performed in public. A man raised his arm vertically and the hand thereupon became corpse-like; a tourniquet was applied and the arm allowed to hang; it remained bloodless. The tourniquet was then removed and both hands were elevated; that which had had the tourniquet flushed, but its control companion became exsanguinated. Clearly the bloodlessness was not due to gravity alone; there was a direct reflex constriction of the arteries. In other words, Lister had discovered a beautiful example of postural contraction in a hollow viscus. In the arteries, as in the bladder or stomach, when the contents diminish (or increase), the muscular wall maintains a constant tension. The next observation of Lister was even more singular and opposed to prevailing opinion; this was that when the pulse wave passes through an artery there is no increase in diameter, but only in length.

The more we consider these facts, the more clear is it that they cannot be accounted for as merely mechanical results of diminution and increase of the pressure of the blood upon the arterial walls, in consequence of the different effects of gravity upon the fluid in the tubes in different positions. The arteries, in any given state of contraction of their transversely arranged muscular fibres, are by no means disposed to yield readily in the lateral direction to increase of pressure from within. This is evident from the fact that they are not increased in diameter by the successive strokes of the powerful muscular pump, the heart. The surgeon, when tying a large arterial trunk in its continuity, does not find, on clearing the vessel of its sheath with the point of his knife, that he is dealing with a body that swells at every pulse, but with one of unvarying dimensions. And in the experiment on the metacarpal artery of the horse above referred to, no changes in the transverse measurements were noticed so long as the limb was maintained in any one position. If any increase do occur in the diameter of an artery in systole, it is inappreciable by ordinary methods of measurement.

When my attention was first directed to this statement by Dr. Halford, of Brisbane, son of my predecessor, Professor Halford, I was frankly incredulous. But the appeal to experiment was simple and the appeal completely upheld Lister. Neither in the carotid nor in the femoral artery of the dog could I detect the slightest increase in diameter during the passage of the pulse wave. I have made advanced students repeat the experiment and have had confirmation from colleagues experienced in pathology and surgery after I had drawn attention to Lister's view. This most impor-



tant quality of the living artery is not even mentioned in Schafer's review of Lister's physiology and finds no place in the text books of today. That the arterial musculature might contract on the passage of the pulse wave was suggested by Bayliss:

There is, of course, the possibility that the muscle of the arterial wall may respond to distension by a contraction as that of the earth worm and the frog's stomach does. This idea is supported by some observation of Carl Tigerstedt (1913), who found an electrical change in the carotid artery with each heart beat ("Principles of General Physiology").

Bayliss, however, believed that a direct response would be too slow. Anyhow, here is a simple statement of fact easily put to the crucial test of measurement, and yet it never appears, as I have said, in the literature of physiology, pathology or surgery.

When Lister was confronted with the great opportunity of his life, he met it with an intelligence, critical, constructive, imaginative and well trained in the experimental procedures of physiology. His was no bedside discovery, though the application at the bedside was the ultimate test. Some surgeons have wondered how it was that Lister, so early in his antiseptic career, suggested certain chemical substances and certain materials which experience proved to be preeminently useful. Such a choice did not arise from pure intuition; behind Lister as the epoch-making surgeon stood Lister the careful physiologist.

The revolution in surgery brought about by the application of the germ theory of infection needs no description here; but there was another revolution not so generally recognized. Before Lister's day surgeons were good anatomists and were master craftsmen in technique, and there their qualifications ended, always excepting John Hunter, of course. Anesthesia removed the necessity for speed, and then with Lister we have a change coming over the personality of the surgeon, who was now distinguished not merely by skill in operation, but by judgement, by scientific imagination and by originality, always keeping before him the function of the organ subjected to his attack. The late Dr. Hamilton Russell used to startle both lay and professional friends by declaring that it was the musician and not the surgeon who displayed great skill, and Russell was an able musician as well as surgeon. What he meant was, of course, that far superior to the digital adroitness of exposing, exploring, excising and suturing was the judgement which determined what should be done and what should not be done.

After Lister came a Victor Horsley, who has a niche in the Pantheon of surgery, less for his technique than for his originality and daring. It was my good fortune to see a good deal of Horsley in University College, and I learned to respect a man who, despite a certain narrowness and occasional impatience, was a great investigator, a man who would allow no professional summons, unless appealing to common humanity, to interrupt a laboratory experiment. The leading surgeons of

today by no possible stretch of caricature can be called mere technicians or exalted carpenters. Their brains are as busy as their fingers; they think before they operate and whilst they operate. They have the spirit of the scientist. In them may be seen a happy marriage between anatomy and physiology. I dare to believe that the historian of the future will stress this altered outlook and will associate this infusion of a new and vivifying spirit into surgery with the name of Joseph Lister.

#### NOTES ON THE PROPHYLAXIS OF RADIONECROSIS.

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##### Superficial X Ray Therapy.

TECHNIQUES in use in the treatment of dermatological disease, where repeated doses of superficial X ray therapy are demanded, rarely result in tissue damage, as doses are suitably fractionated and sufficiently long intervals are allowed between treatments. A single erythema produced by soft X radiation is likely to result in the subsequent development of a chronic X ray dermatitis, which is characterized by the subcutaneous increase of connective tissue collagen and superficial telangiectasis. A late radionecrotic ulcer is a potentiality of any such lesion. Therefore in superficial therapy the production of erythema must be avoided. The use of an aluminium filter, where repeated doses are to be given, will do much to lessen the risks of subsequent trouble. It must not be forgotten that telangiectases can follow doses less than that required to produce erythema of the skin.

##### Deep X Ray Therapy.

Chronic X ray dermatitis has been seen frequently as a sequela of a single erythema produced following radiation at 200 kilovolts with a filter of 0.5 millimetre of copper (*plus* aluminium). This has usually happened when the full dose has been delivered in two or three sessions, at short intervals. It is therefore quite unsafe to produce an erythema with such filtration, for progressive subcutaneous change, telangiectasis and, finally, late radionecrotic ulceration may follow.

The introduction of heavier filters (two millimetres of copper *plus* aluminium) with the same voltage (200 kilovolts) allowed much larger doses of X rays to be administered without producing tissue damage. It is not uncommon to produce an erythematous reaction using radiation thus filtered; but following a simple erythema of this type, in no instance has a chronic X ray dermatitis with telangiectases been observed. Thus it appears that the moiety of X rays traversing a filter of 0.5 millimetre of copper, but which would be stopped by filtration through two millimetres of copper, is apt to initiate chronic tissue changes when a simple erythema dose is administered through the former filter.

Coutard's technique in the radiation of the neck results in the production of an exudative dermatitis, and doses have been given which have produced subacute necroses of laryngeal cartilages or mandible. In the majority of cases radiation is followed by rapid healing; but where such a cutaneous reaction is produced, various degrees of subsequent chronic radiodermatitis, with associated potentialities of late necrosis, must be expected.

The radiotherapist is always face to face with the problem of eradication of malignant disease; but the gravity of the situation does not justify unnecessary damage to tissues. Therefore a filter which is the physical optimum for the given kilovoltage and machine must be used to meet the situation. The required thickness is determined from the curve obtained when the logarithm of transmitted intensity is plotted against varying thicknesses of a given type of filter.<sup>(2)</sup>

The optimum thickness of filter for 200 kilovolts (peak) is approximately two millimetres of copper or 0.44 millimetre of tin.<sup>(3)</sup>

The use of a filter of 0.5 millimetre of copper in a technique of prolonged fractionated radiation which sets out to produce an exudative dermatitis with a 200 kilovolt machine is therefore to be condemned.<sup>(4)</sup> Available methods of preventing unnecessary tissue damage should be fully utilized.

Quantity as well as factors of quality of the therapeutic spectrum must be considered. The chronic radiation dermatitis seen so frequently following the healing of an area treated by a radium pack (0.5 millimetre of platinum filter) is practically identical clinically with a corresponding area of chronic X ray dermatitis. Sequelæ of late necroses, particularly of superficial type, have been not infrequent following radium pack treatments. It is therefore natural to anticipate similar late sequelæ following the massive irradiations of Coutard's technique, in which a radiation softer than the  $\gamma$  rays is used to produce a similar clinical effect. But even more serious is the incidence of subacute necrosis which has followed in some of the more heavily irradiated cases.<sup>(1)</sup> It does not appear justifiable to push the dosage of X rays to such a limit that risks of subacute necrosis are incurred.

#### Beta Ray Therapy.

The caustic action of  $\beta$  rays upon the tissues is well recognized by clinicians. Telangiectases and typical radiation scarring have been observed in an area treated with a dose of  $\beta$  rays which failed even to produce an inflammatory reaction. The use of superficial plaques of radium with thin monel metal screens should be entirely restricted to lesions in which malignant subcutaneous infiltration is absent. A lesion which needs for its eradication doses several times in excess of a  $\beta$  ray erythema dose should be treated instead with a pure  $\gamma$  ray therapy, which may, according to circumstances, be administered by superficial or interstitial technique. Lesions needing massive doses of  $\beta$  rays are unlikely to show a satisfactory result, and damage to supporting tissues predisposes to delayed healing and

necrotic effects. Residual areas of neoplasm cause persistence of the ulcer, and the scarring hinders a later effective treatment, which would have been easy had  $\gamma$  rays been used initially.

Radon seeds of glass are no longer in use, as the necrotic after-effects have proved so serious.

The use of gold radon seeds (of screen equivalent to 0.3 millimetre of platinum) seems also unjustified, for similar bad results follow only too frequently. Special circumstances, demanding a minute radiation source, may call for their use, but the availability of long radon needles of adequate screening<sup>1</sup> has made the practice of dropping implants in a long line from a seed gun out of date.

In place of seeds, gold implants of 0.5 millimetre of platinum equivalent screening have been made.<sup>2</sup> The advantages of more adequate screening are obtained, while the attached thread allows easy removal and disposes of the objection of leaving foreign bodies permanently in the tissues.

#### Gamma Ray Therapy.

The routine use of needles of 0.8 millimetre of platinum equivalent screening has done much to reduce the amount of scarring that follows radium treatment. This scarring is a measure of the damage to tissue, and the less this scarring, the less the risks of late radionecrosis. Similarly, the risks of an immediate or subacute necrosis are diminished by the more heavily screened needles; but in many instances the major aetiological factors in a persistent ulceration may be concerned with the nature of the growth, its site, or the general condition of the patient.

Radium packs caused much subsequent scarring and telangiectases, with a definite tendency to late radionecrosis of superficial type. In some instances immediate complications of delayed healing caused much trouble, and again three cases of subacute necrosis of deep type resulted in sloughing to deep cervical fascia—a complication which was the indirect cause of death in each instance.<sup>3</sup>

Packs have given generally disappointing results where deep glands of the neck were involved. The inconvenience of manufacture, the great discomfort to the patient at all stages, the numerous dressings and the prolonged after-care necessary, the subsequent scarring and telangiectases are some of the serious disadvantages. The routine use of doses so large as were formerly given appears to be unwise in view of the possible complications of delayed healing *et cetera*; and the general adoption of a technique of needling gland fields has abolished the necessity for treatment with packs. Needles allow a much greater interstitial dose, administered with less discomfort to the patient; the incident rays do

<sup>1</sup>Radon needles of lengths up to 12 centimetres and of 0.8 millimetre of platinum equivalent screening are supplied by the Commonwealth Radium Laboratory.

<sup>2</sup>The length of these pieces of apparatus is 5.0 to 7.0 millimetres and the diameter is about 1.2 millimetres. Active content is 1.0 to 1.5 millicuries, as required.

<sup>3</sup>Doses were given up to 180 milligramme-hours per square centimetre at two centimetres distance, or up to 300 milligramme-hours per square centimetre at three centimetres distance (filter 0.5 millimetre of platinum).

not traverse the integument before reaching the neoplastic elements. In an early case of disease of glands of the neck little cutaneous effect persists after a routine field treatment with buried needles; this contrasts greatly with the after-effects of a radium pack.

The advantages of the more heavily screened radium needles which have been provided by the Commonwealth Government are now generally recognized. The value of the 0.8 millimetre platinum screen was obvious soon after the introduction of radon needles thus screened; a milder reaction with much less scarring resulting in comparison with the after-effects of the 0.5 millimetre screened radium needles. It immediately became obvious that the only needles which it was safe to use in sites of radionecrotic predilection were those with the increased screening.

The concentration of radon in needles was originally made two millicuries per centimetre; but in an effort to reduce radionecrotic after-effects this concentration was reduced to 1.5 millicuries per centimetre and a seven-day dose given, corresponding to a six-day dose from a unit strength radium needle. This dosage has been found adequate for lips, tonsils and most skin neoplasms; but, strangely enough, it seems inadequate in the anterior parts of the tongue, where several cases have shown incomplete resolution and subsequent diathermy excision has been necessary.

Effects of cross-fire are difficult to assess mathematically, but must be allowed for clinically, where large fields are under radiation, by relatively wider spacing of the centrally placed needles, besides the general increase in the spacing due to the number of needles. In a breast field it is usually adequate to place the needles from 1.5 to 2.0 centimetres apart.

#### Problems Due to the Site of the Neoplasm.

Radiotherapy of lesions situated on certain notorious sites, such as the dorsum of the hand or the tonsillar area, demands great care. X ray therapy through filters of 0.25 millimetre of copper (*plus* aluminium) has been given in doses of 1,500 to 2,000 r to lesions on the hand, but has given disappointing results in the adeno-epitheliomatous type of neoplasm, where larger doses appear to be necessary. It is with considerable diffidence that one orders doses considerably greater than the erythema dose in the treatment of cutaneous neoplasms. True it is that much time is saved by using lighter filters; but is the tissue damage which is bound to follow to be justified by such an excuse as want of time? It is probable that the ultimate interests of the patient would be better served by using corresponding doses through heavier filters.

Distance  $\gamma$  radiation on the hand will be just as prone to produce a residual ulcer as buried needles, if the neoplasm has been sufficiently destructive to the normal connective tissue architecture. Granulations will not grow readily from the deeper strata of the back of the hand to fill a defect in the mobile

superficial layer, and so any large lesion is very prone to leave a tissue defect exposing tendons. This is really not a primary necrotic effect due to radiation, though such a lesion is often classed erroneously as a subacute radionecrotic ulcer. Minimal doses with effective screening must be the rule when hand lesions are treated with radium.

Tonsillar neoplasms are usually of a radio-sensitive type, and here reduced doses, wider spacing of needles and heavy screening are factors in the reduction of radionecrotic after-effects. Treatment of a widespread tonsillar lesion usually leaves a residual ulcer, the extent of the destruction by the neoplasm making normal healing impossible. The occasional massive necrosis of muscle adjacent to bone in a radiation field is as yet not satisfactorily explained.

Neoplasms on areas close to bone or cartilage (for example, ear, nose, alveolus or tibia) demand radiation with well screened radium. Wright<sup>(5)</sup> has shown experimentally the damage resulting to superficial strata of bone and cartilage following radiation, destruction being much less where heavy screens were used.

Infection supervening on a reaction in one of these sites may produce an osteitis or a chondritis, and the formation of a sequestrum results in a radionecrotic ulcer. Risks of necrosis in these sites are reduced by using minimal doses, heavy screens, and by the adoption of measures to prevent or counteract infection—the latter often a difficult problem in the mouth.

#### Tissue Trauma in Relation to Radiation.

Gross *pyorrhæa alveolaris* is frequently associated with epitheliomatous lesions of lips or mouth. Teeth should be extracted before radiation, as it is only in the rarest or mildest cases that conservative treatment will be sufficient to overcome the infection rapidly; for a prolonged treatment cannot be undertaken as a preliminary to radiation. A short time should be allowed for the traumatized gums to recover partially before the radiation is undertaken. It is very unwise to perform the radium treatment first and then to follow immediately with the extraction of the infected teeth; the radiation appears to cause some local defect of healing, and infection of the alveolus is only too prone to follow. A local osteomyelitis in an unhealed socket results. A similar result may follow radiation carried out too soon after extraction of teeth; a delay of even a few days does much to reduce this risk.

#### Personal Considerations of the Patient.

Every radium treatment results in scarring of some degree; hence any such area is potentially one of lowered resistance. The patient must therefore take care to avoid minor traumata; and, should such occur, immediate steps to prevent infection should be taken.

Telangiectatic areas should be protected from direct sunlight. Such areas react severely to sunburn, which may initiate a breakdown process.



Patients undergoing X ray therapy must be warned against exposure to sunlight during or after treatment, as several instances of severe erythemas and subsequently developing telangiectases have been seen where a patient has sun-bathed an integument which had received considerably less than an erythema dose.

The protection of a lower lip scar from sunlight is often satisfactorily solved by the growth of a moustache, but the shielding of certain of the neck regions is often more difficult, especially in this climate. It is therefore all the more necessary to warn such patients of the risks of sunlight on scars.

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#### INFRA-RED IRRADIATION IN THE TREATMENT OF RADIONECROTIC ULCERATION.<sup>1</sup>

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THE absence of any tendency for early separation of the necrotic tissues makes the task of promoting the healing of a radionecrotic ulcer most difficult. The dense sclerosis, the relative absence of blood channels, the inadequacy of the leucocytic response to the dead tissues, and the absence of any definite boundary between necrotic and living parts of the ulcer zone are all factors assisting the chronicity of the process. The clinician must therefore attempt to rid the ulcer of all necrotic elements, infection must be overcome, and growth of new tissue stimulated. Granulation tissue formation in radionecrotic ulcers is inhibited owing to the paucity of the vascular connexions.

The whole problem appears to resolve itself into one of improving a restricted blood supply. The vascularity can be increased by one of two methods: first, by promoting an increased blood flow in existing channels, or, secondly, by aiding the formation of new vessels. Any improvement in the circulation in existing vessels would probably result in the formation of new channels, as exemplified in the capillary buds of granulation tissue.

Infra-red irradiation offered a suitable method of stimulating the circulation in the existing vessels. Improvement of the circulation in the first place was expected to increase the number of phagocytic cells in the tissue spaces and therefore to hasten the separation of the slough. Secondly, the removal of the necrotic material might be followed by processes of repair in the damaged area. The separation of the necrotic tissue would naturally be associated with a diminution in the sepsis, which is always a major factor in any radionecrotic ulcer.

#### The Infra-Red Radiations.

The term "infra-red" is given to that section of the electro-magnetic spectrum extending from the red rays of the visible spectrum up to the wireless waves of Hertz.

The waves are given out by hot bodies and can be generated beyond 3,000,000 Ångström units (one Ångström unit equals one ten-millionth of a millimetre). Infra-red rays of the first octave (8 to 16,000 Ångström units) penetrate water and will pass through three centimetres of tissue before being absorbed. The second and the third octaves are more readily absorbed by water or tissue, while waves beyond 64,000 Ångström units have no therapeutic use on account of their rapid absorption. The deepest penetration is produced by a combination of the red rays of the visible spectrum and the short infra-red rays up to 11,000 Ångström units.

Infra-red rays are produced by heating solid bodies to a high temperature—the hotter the body, the greater the number of short rays emitted. The spectrum is a continuous one. The following table (from Troup), showing the energy distribution in the ultra-violet, visible and infra-red portions of the spectra emitted by the enumerated sources, is of interest:

Source.	Portion of Spectrum.		
	Ultra-Violet.	Visible.	Infra-Red.
Sunlight .....	7%	13%	80%
Carbon arc .....	5%	10%	85%
Mercury arc .....	28%	30%	52%
Tungsten filament ...	16%	16%	68%

The solar spectrum contains few waves longer than 15,000 Ångström units. A hot water bottle emits rays of 64 to 80,000 Ångström units. A glower electric radiator filament gives rays from the red to 64,000 Ångström units. The Grothaus law applies—only those rays that are absorbed are effective in the production of heat or chemical change.

#### Apparatus.

The lamp employed initially was a standard make of Ocken-Sollux, by Hanovia, and consisted of a 1,000 watt tungsten filament bulb mounted in a parabolic and conical reflector. Latterly, a glower burner, with a 1,000 watt electric radiator filament in a suitable reflecting apparatus, has been used, as the fragility of the tungsten filament lamps made operating costs excessive. A focusing device gives

<sup>1</sup> Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

a choice of divergent, convergent or parallel rays; and a stud rheostat allows regulation of filament temperature. The lamp works equally well on either an alternating or a direct current. Screens of red or blue glass may be used to cut off the long infra-red rays and thus give a combination of short infra-red rays with the red or blue portions of the visible spectrum.

#### Effects of Radiation.

The lamp was standardized by a series of irradiations self-administered (P.A.B.). The forearm was selected because the absence of subcutaneous adipose tissue afforded an excellent site for observations of underlying muscle contours. The intensity of radiation was controlled by the stud setting of the rheostat, and the distance of the lamp from the part was decided by the tolerance of the skin for heat.

A definite erythema appeared within five minutes, which was replaced in ten minutes by hyperæmia, first of the skin and subcutaneous tissues and later of the underlying musculature. The infiltration of the skin and subcutaneous tissues was easily detectable on palpation, and the swollen condition of the muscles was evident to sight and touch.

The hyperæmia deepened as the irradiation was continued, and the skin developed a tenseness and redness not obtainable with diathermy or galvanism. The sensation of heat in the skin gradually increased and became unpleasant after the exposure had lasted half an hour, when the test was terminated. This unpleasant sensation of heat gradually lessened and disappeared within the following three hours. By this time the hyperæmia had diminished in intensity, and had completely disappeared within ten hours.

A further experiment showed that the whole reaction was more pronounced with the red screen than with the blue filter; with the red came a curiously irritating and stimulating sensation, while with the blue screens the effect was distinctly sedative—a cool, soothing mildness difficult to describe. The erythema, hyperæmia, and muscle engorgement were all more pronounced with the red filter, which was therefore selected for the cases to be treated. The sedative action of the blue light has been employed in recent cases where pain or discomfort was associated with radiation through the red filter.

#### Therapeutic Actions of the Infra-Red Rays.

The heat produced by the absorption of the rays causes vaso-dilatation of cutaneous and deep arterioles and capillaries, leading to an increased blood flow through the part, and to an increased exudation of lymph. The hyperæmia, which appears as a cutaneous erythema, lasts in the deeper tissues from three to ten hours. The depth of the action produced allows a tonsillar lesion to be radiated from an external field. Whereas the ultra-violet rays produce a purely superficial effect of delayed onset and of much longer duration, the infra-red rays not only produce an immediate effect of shorter duration, but produce their effect at a considerable

depth. This property of producing vaso-dilatation at depth indicated the use of these rays in the treatment of radionecrotic ulceration; for here the major problems of treatment appear to be intimately bound up with considerations of deficient vascular connexions in the zone between necrotic and normal tissues.

#### Treatment Factors in Radionecrotic Ulceration.

The lamp is placed at a 37.5 centimetre (fifteen inch) distance from the skin at the commencement of treatment. The surrounding skin is protected by a smear of vaseline, which is impermeable to the infra-red rays. Daily irradiations are given until sloughs commence to separate, when treatments are gradually cut down to two per week. The red filter is used unless discomfort demands the use of the blue glass. Dosage is determined by the tolerance of the part for heat—sessions do not exceed half an hour at any one time. The distance of the lamp from the lesion is gradually reduced to 20 centimetres (eight inches) as the skin tolerance daily increases.

Separation of the slough is naturally slow; the first changes are seen when the slough becomes less tenacious, and, as it separates, islets of granulations appear, growing under the fibrinous superficial coagulum. The surrounding induration begins to disappear from the periphery, the edges of the ulcer even up and begin the shelf; the fibrin gradually disappears, and the granulation islets coalesce to cover the base of the ulcer. The epithelium grows down from the edges, the final effect being that of a slight depression covered with a parchment-like epithelium.

#### Precautions during Treatment.

Constant watchfulness is imperative during treatment to guard against blisters. Any suspicious spot should be protected by a smear of vaseline. It is well to keep on the safe side of the patient's tolerance for heat, particular caution being exercised when dealing with the foolhardy type who can "stand a lot", or with the submissive person who does not like "to be a bother".

Special goggles, proof against infra-red rays, must be worn by patients undergoing treatment about the face.

#### Case Reports.

Some fourteen patients with radionecrotic ulcers have been treated with infra-red radiation, and it has been thought worth while to append brief notes of two cases, the course of which has been typical of others.

This paper has been written with the hope that other surgeons might try this mode of treatment, rather than with the idea of being dogmatic about the results of a new type of therapy which, up to the present, has not had a sufficiently wide clinical trial.

F.J.W., Number 2,329, reported for treatment of a large hypertrophic epithelioma, four by five centimetres, and raised two centimetres, situated on the mid-line of the back of the neck. On February 2, 1934, the hypertrophic

parts were removed with the diathermy knife and the base was radiated with a series of three parallel needles, each six centimetres active length, screened with 0.5 millimetre of platinum, and of two millicuries per centimetre initial intensity. A five-day dose was given.

The area slowly healed, till on May 8 a central area, 2.5 by 1.5 centimetres, remained to be covered by the ingrowing epithelium. One month later a central slough indicated the onset of a subacute radionecrotic process. The necrosis extended, involving the *ligamentum nuchæ*, and caused considerable pain.

Infra-red therapy was commenced on September 12, 1934. One month later the slough commenced to separate, and three months later the base of the ulcer was completely covered by healthy looking granulations. Healing was finalized by a Wangenstein's skin graft.

M.L., Number 995, reported in September, 1931. An infiltrative type of epithelioma, three centimetres in diameter, with central ulceration, was situated proximal to the anatomical snuff box on the right forearm. Two two-centimetre and two three-centimetre radon needles, screened with 0.5 millimetre of platinum, and of 1.9 millicuries per centimetre initial intensity, were buried for six days. The lesion responded well to treatment and remained healed and clear till April, 1934—over two and a half years.

The patient reported then with a typical late radio-necrotic ulcer showing peripheral induration and central sloughing. He said that he had injured the area five weeks before, causing an abrasion which became inflamed, and a sore appeared which would not heal. Excision of the ulcer was refused, and the size of the lesion increased during the next four months, both peripherally and deeply, in spite of the usual conservative treatment. On September 4, 1934, the necrotic tendons of *abductor pollicis longus* and *extensor pollicis brevis* were excised from the floor of the ulcer, and he was sent for infra-red therapy.

Two months later all the necrotic debris had separated from the edges and healing was commencing. Examination six months after treatment was started showed a residual ulcer, one centimetre in diameter, exposing part of the radius, the epithelium having grown to the edge of the exposed dry bone.

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#### THE GENERAL PRACTITIONER IN A NATIONAL ORGANIZATION AGAINST CANCER.<sup>1</sup>

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In any national scheme of organization against cancer the welfare of the patient is the first consideration. His welfare involves the provision of every facility for accurate diagnosis as early as possible, and for access to the form of treatment most suitable to that stage which the trouble has reached when the patient is first seen. In any scheme, therefore, the general practitioner is second in importance only to the patient and has prior claims to the specialist and institutions. For in the

majority of cases the patient is first seen by the general practitioner, and it is through him that the patient gains access to the specialist or that such access is delayed. Moreover, in the advanced cases of cancer, when the specialist has done his best or worst, or has been forced from the beginning to say that the patient is beyond cure, a large number of patients insist on remaining in their own homes rather than in institutions, and in these cases it is the general practitioner who has to continue with the palliative treatment that eases the downward progress to the grave.

Yet the needs of general practitioners vary tremendously, according to whether they practise in the city or country, near a large centre, or far removed from a centre with a laboratory and hospital facilities. Their individual realization of their needs in the light of the ever-growing knowledge of the specialist varies just as much, according to their age, their temperament, their frequency of contact with specialists and hospitals, their conservatism or enthusiasm for new methods. These variations make it impossible for one individual to visualize or put forth a scheme adequate for the needs of all general practitioners. I can justify my temerity in acceding to the request for this paper only by stating that before preparing it I have written to or interviewed as many practitioners as possible with wide general experience, both in the country and city, and that while I recognize they can represent the needs of only one State, I have been struck with the large measure of agreement in their views. Also it must be remembered that my statements set forth only an ideal towards which we should be working—an ideal only slowly to be reached by experiments, with much stumbling by the way, and with progress proceeding at different rates in different States.

As any general scheme of organization against cancer must be a voluntary one and must depend on the voluntary cooperation of general practitioners, I would place in the forefront the necessity of the organization keeping every general practitioner acquainted with new practical developments of diagnosis and treatment. Assuming that each State sets up its own State organization, each affiliated with a central national organization and functioning locally through its central clinic, then through its members who are on the university faculty of medicine, each State organization will see that directly or indirectly the medical student is grounded in modern methods of diagnosis and treatment, without adding to his already heavy burden of separate courses of lectures or additional examinations. The post-graduate courses in each capital must include each year some special demonstration for general practitioners regarding cancer, either of a special organ or in general demonstrations. But these post-graduate courses reach only a certain proportion of practising men, and the keenest of them. *The Journal of Cancer Research* also is necessarily mainly a specialist's journal. What the body of general practitioners need is periodical succinct statements of progress in particular fields of cancer. At our Adelaide clinic, for

<sup>1</sup> Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.



instance, we hold a quarterly evening meeting at which a member presents a *résumé* of recent literature regarding cancer of a particular organ. The last *résumé* brought out the increasing emphasis on pre-operative irradiation of the breast in the treatment of cancer. The present one summarizes the results of surgical and radiotherapeutic treatment (separately or combined) of cancer of the uterus. It has been arranged that these shall be distributed to all practitioners in the State every quarter by our organization. Some such plan should gradually become a function of each State organization.<sup>1</sup>

Hand in hand with such educative measures, and made more necessary by them, must go the provision for all general practitioners of every facility for: (i) prompt diagnosis, (ii) decision as to best methods of treatment, (iii) facilities for carrying out such treatment.

Facilities for diagnosis include clinical methods, biopsy, biochemical and radiological examination. Patients themselves are beginning to demand radiological examination for internal troubles; medical practitioners themselves are more and more sending sections from external neoplasms for pathological examination. But the expert clinician will often see the necessity for such special examination long before the general practitioner. Here comes in the paradox of the present position. The indigent patient or the lodge patient in the city will promptly be sent into hospital for such examination; patients who are comfortably off will have it done privately, but in the intermediate class, which comprises the bulk of patients, delay will occur because of the practitioner's desire to save them incurring expense. The general practitioner needs diagnostic facilities for such patients, to be made available in such a way that if the results of such examination negative the diagnosis of cancer, the treatment of the patient should be left in his hands. The conscientious country practitioner, for instance, will send such a patient with, say, a doubtful gastric carcinoma to a general hospital for a test meal and radiographic examination, but if such examination reveals a duodenal ulcer or gall-bladder infection, at present the patient is often retained in hospital for treatment, which could be just as well given at home. It would appear, then, that the next step in organization is the gradual provision of subsidiary diagnostic centres in planned country centres, to which surrounding practitioners could send patients for their investigations and consultations, possibly by telephone, with a named member of the institutional staff. Special forms could be printed and sent in with the patient, with statement of investigation required, name of consultant, and a printed declaration that treatment is not to be started till the general practitioner has been consulted. Wherever desirable, the patient would be returned to his own medical attendant for treatment; but if the patient were retained in hospital or with a consultant for special treatment, then for intermediate patients this would be done at a mutually agreed

reduced fee, and poor patients would not be charged in consideration of fees recovered from others. With modern methods of transport these centres could deal with patients within a radius of fifty miles or more.

The decision as to best method of treatment would be arrived at in the same way, and this method could also be employed for patients who when first seen are regarded by the general practitioner as inoperable. Few things have been more impressive in the past few years than the effect of X ray treatment in rendering inoperable cases operable, or in removing the suffering of laryngeal cancer, for instance, and I think the way should be made clear for no general practitioner to start palliative treatment with sedatives without consultation. In these intermediate cases this would mean the creation of a fund from which such consultants should be paid.

The method of carrying out any surgical measures that may be decided upon would naturally be adjusted between the consultant and the general practitioner, as at present. If slight, they could be left to the general practitioner or to the general practitioner in conjunction with the consultant. If more serious, they must be done by a specially trained surgeon. In surgical treatment these matters, even in respect of reduced fees for the "intermediate" patients, are already being adjusted by ordinary professional usage, but the right of the general practitioner to after-treatment still needs safeguarding in many cases.

But if radiotherapeutic measures are decided upon, the position of the general practitioner has not yet been clarified. It is generally agreed that radium should be used only by men trained to its use, and much more so is this true of deep X ray therapy. The expense of equipment with either weapon prevents general practitioners purchasing radium or an X ray plant for occasional use. This will become more and more true of X ray plants. With regard to radium, the position is not quite so clear. Men are already coming back from post-graduate study with practical acquaintance with the use of radium, but without the means to purchase any large supplies. As time goes on, more general practitioners will have the knowledge sufficient to treat small lesions with radium and radon. Up to the present the matter has been easily settled by the general practitioner handing over any patient requiring radiotherapeutic treatment to the central clinic, not merely for treatment, but for after-observation. With the radium loaned by the Commonwealth, and with treatment in the experimental stage, this was necessary for standardization of treatment and of records. But now that radiotherapeutic clinics have passed the experimental stage, it is doubtful whether this is so necessary. It is doubtful also whether the general practitioner will for long acquiesce in the control of the patient passing entirely out of his hands; it is doubtful also if clinics will not become overcrowded and to that extent less efficient by more and more

<sup>1</sup> The *résumé* mentioned by Dr. Hone will be found in this issue at page 789.—Editor.

reporting. It would seem that by some modification of procedure many patients could now be allowed to report to the general practitioner who is their regular medical attendant, especially if resident in the country; and that the period after special treatment at which such reporting is allowed, could gradually become shortened as general practitioners become gradually acquainted with the immediate reaction which follows treatment by radium or deep X rays. In this way general practitioners would gradually be brought into closer touch with clinics.

For the general practitioner needs to be trained in realization of the effects of radiotherapy measures, both immediate and remote. Further, if he is always to be expected completely to give up even mild cases that are treated by radiotherapeutic methods, while he can retain in his own hands mild cases treated by surgery, we are asking of him more than we can expect. Especially is this the case in the country in private cases, say, of rodent ulcer or epithelioma of the lip, which the general practitioner would excise at less charge than the ordinary fee for radium, leaving out the necessary cost of transport.

This logically leads later on to the question of distribution of radon to certain of these diagnostic centres, but that is rather a matter for organization regarding institutions than for the general practitioner at present. But there seems to be no reason why radon should not be issued on application to such practitioners as can show evidence of acquaintance with radiotherapy.

#### PARENTERAL INJECTION OF FOREIGN PROTEIN IN THE TREATMENT OF GONOCOCCAL OPHTHALMIA.

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THE treatment of both adult and infantile gonococcal ophthalmia has in the past been most unsatisfactory. In fact the treatment of all gonococcal infections of the human body is at the moment far from ideal. In the past all mild local antiseptics invented have been used in turn in this type of ophthalmia without avail, and in some cases they have positively done harm. Vaccines<sup>(7)</sup> in every form have been tried without any improvement in the visual results obtained, so that the mainstay of most oculists for the last ten years has been frequent irrigations of the affected eye with a mild antiseptic lotion and complete occlusion of the unaffected eye with a Buller's shield. To this some have supplemented canthotomy for the affected lids; but that is not a universal practice.

Four years ago while inspecting the ophthalmic wards of the New York Presbyterian Hospital—there popularly known as the "Medical Centre"—I was incidentally shown a case of adult gonococcal ophthalmia by Dr. Daniel Kirby. He then stressed

the fact that this patient, as well as several other recent patients suffering from the same disease, had derived great benefit from large doses of foreign protein given intramuscularly every second day, and he attributed the favourable result to the general reaction and high pyrexia induced by the massive doses. I was extremely interested in his assertion for two reasons: first, I had seen many eye patients with diseases other than gonococcal ophthalmia treated with foreign protein injections without favourable results, and secondly, I failed to remember one adult patient with gonococcal ophthalmia who had left any of the teaching hospitals in which I had worked, with good vision in the affected eye. My memory on this point may have been slightly inaccurate; but nevertheless the results were invariably bad. Being somewhat of a methodist, I had made a note of his technique, and it was three and a half years later before I was able to put it into action. Kirby's technique was as follows: injections of cow's milk (which had been boiled for four minutes) given intramuscularly into the buttocks on alternate days; commencing with ten cubic centimetres, the dose was rapidly increased to twenty-five cubic centimetres.

#### Diplococci and Heat.

For many years it has been known that both the Gram-positive and the Gram-negative diplococci cannot resist a moderate rise of temperature while being incubated. Corbus and O'Connor<sup>(2)</sup> state that any temperature above 38.9° C. (102° F.) will kill gonococci in the incubator within twelve hours. Howell and MacCallum confirm this. Cumberbatch and Robinson describe in their book, "The Treatment of Gonococcal Infection by Diathermy", how they have put that fact into practical application. They were able both in the male and female by raising the temperature of the urethra and cervix by means of diathermy to eradicate rapidly the gonococci from long-standing infections. I have had no personal experience of this type of work, but eight years ago when working at the Launceston Hospital, we obtained remarkably successful results in the treatment of lobar pneumonia with the diathermy current. Consequently there seems to be no doubt at all that these Gram-positive and Gram-negative diplococci are unable to withstand a moderate rise in temperature either in the incubator or in the human body for any length of time.

#### Foreign Protein Therapy.

The application of diathermal current for the alleviation of eye disease has not proved uniformly successful to date, so American oculists have looked for a more convenient method of raising the body temperature in gonorrhoeal ophthalmia. After trying numerous foreign proteins and serums that have at last all agreed that milk produces the best uniform rise in body temperature. Each surgeon varies slightly in his technique; for instance Mustal<sup>(6)</sup> and Cunningham<sup>(1)</sup> advise daily injections of increasing doses, while Redding<sup>(8)</sup> advises daily injections of ten cubic centimetres. But all seem to agree that it is essential to keep the body temperature swinging on a high level.



Both adult and infantile gonococcal ophthalmia have been treated by this method of induced pyrexia in America for the past six years; but the results with *ophthalmia neonatorum* have been as disappointing as the results with adult ophthalmia have been satisfactory. It has been the routine practice to commence treating the babies with four cubic centimetres, increasing to six cubic centimetres on the third day and to eight cubic centimetres on the fifth day. Mustal<sup>(6)</sup> reports the cure of a three-weeks-old baby treated with five cubic centimetres on the first day and eight cubic centimetres on the third day, and it is possible that in the past we have been treating the babies too leniently. I have treated three babies recently with injections of four cubic centimetres, six cubic centimetres and eight cubic centimetres on alternate days, and have been unable to notice any improvement from the injections. In the next case that appears for treatment I intend increasing the dosage considerably as advised by Mainzer<sup>(5)</sup>; I hope to report the results later.

#### Contraindications.

The one risk of milk injections seems to be anaphylaxis, so that it is always wise to have adrenalin at hand and to give 0.6 cubic centimetre (ten minims) hypodermically at the first indication of distress. Gluteal abscesses may occur; but they respond readily to the orthodox treatment.

Nevertheless there are several groups of patients in which milk injections are definitely contraindicated. These are specified by El-Bakly<sup>(3)</sup> thus: (i) Weak and debilitated patients, especially marasmic children; (ii) tuberculous patients; (iii) patients with kidney disease; (iv) women in the last months of pregnancy.

#### Histories of Two Cases of Adult Ophthalmia.

The object of this paper is to bring to notice the two cases of adult gonococcal ophthalmia which I have seen recently and the only two in which I have had the opportunity of trying foreign protein therapy.

**CASE I.**—The patient was a male, aged twenty-one years, who had suffered from acute gonorrhoeal urethritis for five days and a swollen left eye for three days. The left eye had been discharging profusely for two days. On examination the visual acuity in the right eye was  $\frac{1}{4}$ , and in the left eye  $\frac{1}{100}$ . The right eye was normal. There was marked swelling of the upper and lower lids of the left eye, and chemosis was pronounced; the cornea was clear; there was a profuse discharge.

**Subsequent History.**—I immediately took a smear from the left eye, and gonococci were demonstrated in it. Without delay I covered the right eye with a Buller's shield and did an external canthotomy on the left lids. The necessity of a Buller's shield on the unaffected eye is obvious, and it appears to me the necessity of a canthotomy on the affected eye to allow adequate drainage is obvious too; but it is not universally performed. Straightway he was admitted to hospital in strict isolation, with special nurses. Hourly irrigations of *Lotio Acidi Borici* and drops of a 1% solution of "Mercurochrome" every four hours were ordered, and ten cubic centimetres of milk were given intramuscularly *statim*. Next day the fourth-hourly chart showed a rise of temperature to 38.6° C. (101.6° F.), falling on the third day to 37.5° C. (99.6° F.), so fifteen cubic centimetres of milk were given the same day into the other buttock. On the fourth day the thermometer registered 38.7° C. (101.8° F.), while on the fifth day it only registered 36.9° C. (98.4° F.), so twenty-five cubic centimetres of milk were given, and on the sixth day the temperature rose to 38.7° C. (101.8° F.) again and the discharge from the left eye was much less. On the

seventh day the temperature fell to 37.2° C. (99° F.). As this high pyrexia was causing the patient slight discomfort I desisted with the milk, and on the eighth day lightly painted the upper lid with silver nitrate solution (2%), as slight corneal infiltration was appearing above. On the ninth day, as the discharge was not lessening, fifteen cubic centimetres of milk were given again, and on the tenth day the thermometer rose to 38.7° C. (101.8° F.) again, to fall to normal on the eleventh day. On the twelfth day the eye had so improved—the chemosis and swelling had entirely gone—that only fifteen cubic centimetres were given again; but this time the rise was less, only 38.2° C. (100.8° F.) being recorded on the thirteenth day, and on the fourteenth day the temperature was normal again. As there was still a moderate quantity of discharge from the left eye on the fifteenth day, I decided to paint the upper lid again with 2% silver nitrate solution and suspend the milk for the moment. The result from the painting was alarming and almost disastrous—the swelling, chemosis and discharge recurred with renewed severity, and the cornea above developed a definite ulcer—so on the sixteenth day twenty cubic centimetres of milk were given; but the highest rise on the seventeenth day was 37.3° C. (99.2° F.). On the twentieth day, as the eye was still in a very precarious state, I changed from 1% "Mercurochrome" to 10% "Argyrol" drops, and I gave a vaccine of typhoid and paratyphoid A and B (30,000,000 organisms) intravenously as advised by Gifford.<sup>(4)</sup> The same day the temperature rose to 38.3° C. (101° F.). On the twenty-first day it was still 38.3° C. (101° F.), while on the twenty-second day it had fallen to normal. On the twenty-third day the eye was showing marked improvement again, so an intravenous injection of a vaccine containing 60,000,000 organisms (typhoid and paratyphoid A and B) was given, and the same day the temperature rose to 39.4° C. (103° F.), but the following day fell to normal. On the twenty-fifth day the left eye was remarkably well; but to be more certain of my objective this time I gave 100,000,000 organisms of a typhoid and paratyphoid A and B vaccine intravenously, and the next day the temperature rose to 38.3° C. (101° F.), to fall on the twenty-seventh day to normal. There was no further rise till the patient left the hospital.

On the thirtieth day the eye was so clean that a smear was taken and no gonococci could be found. On the thirty-fourth day a further smear was taken and this proved negative also; the Buller's shield was removed from the right eye on the thirty-sixth day, and on the thirty-seventh day the patient left the hospital.

**Result.**—One month later the patient reported, and except for a vascularized opacity of the upper one-third of the left cornea the eye was perfectly normal.

When I last saw him, six weeks later, the left corneal opacity was fading and the vision of the left eye with correction

$\left( \begin{smallmatrix} -0.75 & \checkmark \\ -0.75 & 75^\circ \end{smallmatrix} \right)$  was  $\frac{1}{4}$ , and Jaeger 2.

It is hardly necessary to add that the urethral discharge was equally vigorously treated, and that by the time the eye was declared cured the urethra also was free from infection.

This case I feel presents four obvious lessons: (i) That high pyrexia is a definite aid in the treatment of adult gonococcal ophthalmia; (ii) that the pyrexia must be continuous and maintained until all discharge ceases; (iii) that if the patient becomes immune to one foreign protein then another must be substituted; (iv) that the use of 2% silver nitrate solution (however useful in other forms of ophthalmia) is strongly contraindicated in the treatment of gonorrhoeal ophthalmia even in the later stages.

**CASE II.**—The patient was a woman, aged twenty-one years, who was seen in consultation in hospital. For three days before admission there had been a quantity of watery discharge from the left eye. The day before admission the left lids had become painful and swollen. She had been in hospital six days. A smear taken from the left eye on the day previous to consultation contained gonococci, so ten cubic centimetres of boiled milk had been given intramuscularly the same day. Vaginal examination revealed a copious discharge, and examination of a smear from the *cervix uteri* also demonstrated gonococci.



On examination the right eye appeared to be normal. The left upper lid was swollen; there were conjunctival discharge and chemosis; and there was a perforation of the cornea with prolapsed iris at the limbus, at three o'clock. There were also two central areas of corneal infiltration.

This case presents three obvious lessons:

(1) I consider that in all cases of gonorrhoeal ophthalmia with corneal ulceration the whole cornea should be covered with a conjunctival flap at once.

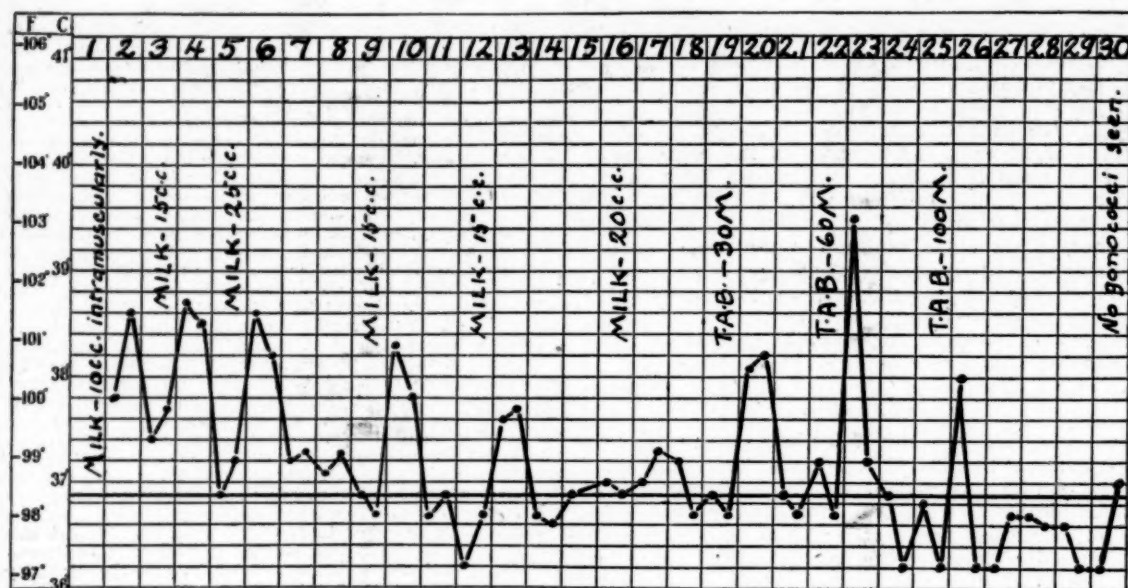


FIGURE I.

(An error has been made in the reproduction of this chart. On day 10 the reading should be 38.8° C., and on day 13, 38.2° C.)

**Subsequent History.**—The same day under general anaesthesia the prolapsed iris was excised by the Lister method and the whole cornea covered with a conjunctival flap with a purse-string suture. *Lotio Acidi Borici*, guttae "Mercurochrome" (1%) and *Guttae Atropinae Sulphatis* (1%) were ordered for the left eye, and the right eye was occluded with a Buller's shield. There was no reaction whatsoever from the first milk injection, so on the eighth day after admission to hospital fifteen cubic centimetres of milk were given into the other buttock, and the same night the temperature rose to 38.9° C. (102° F.) to fall on the ninth day to normal. On the tenth day twenty-five cubic centimetres of milk were given, and the same night the temperature rose to 39.0° C. (102.2° F.) and did not fall to normal till the thirteenth day, when twenty cubic centimetres of milk were given; on the fourteenth day the temperature rose to 38.3° C. (101° F.) to fall to normal the same evening. Twenty-five cubic centimetres of milk were given on the fifteenth day, when the temperature rose to 39.4° C. (103° F.) and did not return to normal till the seventeenth day. There was no further rise in temperature while the patient was in hospital.

Subsequent to the operation the eye discharged freely; but after the tenth day the discharge lessened rapidly, and by the fifteenth day had ceased. On the following day I removed the purse-string suture, and by the eighteenth day the conjunctiva had returned to its normal situation except over the site of the prolapse, where it remained firmly and permanently adherent to the cornea. Swabs taken from the left eye on four successive days after the twenty-first day revealed no gonococci. As the cornea had completely healed, the patient was allowed up on the twenty-sixth day.

As the eye remained red and irritable, and as the vaginal discharge had not cleared, the patient was kept in hospital till the fortieth day, and on the forty-fourth day, when she reported for observation, her visual acuity in the right eye was  $\frac{1}{16}$ , and Jaeger 1, and in the left eye, with correction of  $\begin{pmatrix} -1.0 \\ +2.5 \end{pmatrix}$  105° his visual acuity was  $\frac{1}{12}$  (partly) and Jaeger 2.

My observations on the left eye were as follows: "Eyes still pink and a little lachrymose; conjunctiva adherent over outer quarter of cornea; two central corneal nebulae; complete iridectomy with free pillars at three o'clock; tension normal".

I did not do this with the first case, as a flap of chemotic conjunctiva fortunately covered the ulcerated area for me.

(2) A purse-string suture carefully inserted is the only sure method of keeping the conjunctival flap *in situ* for the desired period, namely ten days or longer.

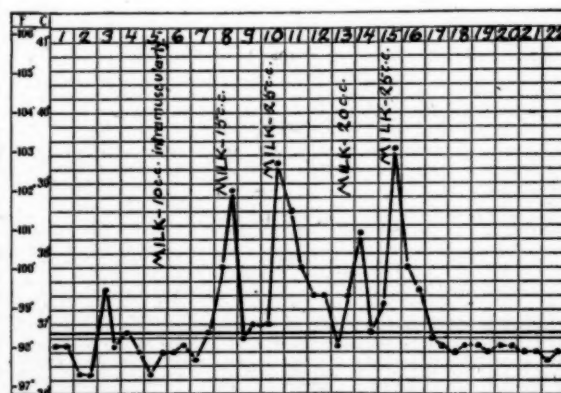


FIGURE II.

(3) Even perforated eyes due to gonococcal ophthalmia are not hopeless if treated along the lines indicated above.

#### Summary.

Massive doses of foreign protein, given intramuscularly or intravenously on alternate days so that

the body temperature is left swinging at a high level, are specific for gonococcal conjunctivitis in adults.

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### A CRITICAL ANALYSIS OF DIPHTHERIA IMMUNIZATION IN A PROVINCIAL CITY.

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For many years there has been a high incidence of diphtheria in the city of Bendigo. For the period 1910-1919 there was an annual incidence in Bendigo and immediate environs of 84.6 per 10,000 of population, a very high rate in comparison with the rest of the State of Victoria. This is illustrated by figures supplied by the Victorian Government Statist (Table I).

TABLE I.

Annual Cases of Diphtheria per 10,000 of Population.

Area.	Period.		
	1910-1919.	1920-1929.	1930-1934.
Greater Melbourne ..	39.3	24.80	31.59
Ballarat .....	24.3	29.96	61.60
Bendigo .....	84.6	51.24	59.73
Geelong .....	43.4	49.10	45.60
Remainder of State ..	25.7	27.33	26.90

This high incidence has been associated with a high mortality rate because of a case fatality rate comparable with that of the State over the same period, showing that the number of notified cases has not been increased unduly by local factors affecting the notification of infectious diseases, or, alternatively, that the disease has always been of high virulence. It is assumed that means for early diagnosis, dosage of antitoxin and nursing facilities, factors which naturally influence the case fatality rate, compare favourably with those in other parts of the State. Comparative mortality rates are given in Table II.

In 1923, Dr. Keith Moore, then Medical Officer in Charge of the Commonwealth Health Laboratory, Bendigo, inaugurated an immunization campaign among school children aged six to fifteen years, using toxin-antitoxin as the immunizing agent. In a series of 1,493 completed Schick tests, he recorded 701 positive reactions and 792 failures to react, a percentage of positive reactions of 46.96%.<sup>(1)</sup>

TABLE II.

Area.	Case Fatality Rate, Diphtheria (Percentage).		Mortality per 100,000.	
	1920-1929.	1930-1934.	1920-1929.	1930-1934.
Greater Melbourne	2.94	2.15	7.29	6.78
Ballarat ...	4.58	2.22	13.73	13.70
Bendigo ...	2.01	1.63	10.32	9.71
Geelong ...	1.80	1.67	8.86	7.62
Remainder of State ....	3.34	2.37	9.13	6.36

Five hundred and seventy-nine children received the full course of three injections, and 94 received one or two injections.<sup>(2)</sup>

Two months after completion of the immunizing treatment, retests were carried out. Of 533 children receiving three injections, 304, or 57%, failed to react to the Schick test, and of 48 receiving two injections, 30, or 62.5%, failed to react.<sup>(3)</sup>

In 1924 a further series of 961 Schick tests among school children was carried out by Dr. Moore. Four hundred and fifty-four, or 47.2%, were classed as positive, and 507, or 52.8%, as giving no reaction.<sup>(4)</sup>

Three hundred and seventy-four children received the full course, and 29 received two injections only. Retesting took place in four months, and of 326 children who received the full course, 314, or 96.3%, gave no reaction, while of 14 children who received two injections, 12, or 85.7%, failed to react.<sup>(5)</sup>

Dr. Moore estimated that in 1923, 82.8% of all those subjected to the Schick test were thus shown to be immune two months after those giving a positive reaction had been immunized, and in 1924, 98.35% after four months.

In Dr. Moore's series it was considered that 40% of the total school children in Bendigo and Eaglehawk had been covered, representing 25% of the total child population of the district.

From 1924 to 1931 there was no immunization work carried out in the city of Bendigo. In 1932, owing to the increased incidence of diphtheria in the previous year and the greater prevalence then existing, Schick testing and active immunization were again instituted in the schools. Of 789 children over three years of age, 435, or 55.1%, were found to react to the Schick test. Of 97 adults tested, 37, or 38%, gave positive reactions. In taking a reading, all "faint positives" were regarded as positive. Four hundred and thirty-nine individuals, including 32 children under three years of age who had no preliminary Schick test, were, at an interval of three weeks, given two subcutaneous doses of anatoxin (Commonwealth) (1.5 cubic centimetres in all), and 22 received one dose only. The small number of Schick-positive anatoxin-positive individuals were not immunized.

In 1933, 637 individuals were tested and 76 were given immunizing injections without a preliminary Schick test. The percentage of positive results obtained from the tests was 52.4%, and 88 individuals received three doses of anatoxin (2.5

cubic centimetres in all); 276, including 76 children under three years of age not tested, received two doses, and 20 received one dose only.

Retests on immunized children, taken at an interval of nine to twelve months after the course of immunization, showed the following result. Of 313 children who gave positive reactions to the Schick test and who were immunized with two doses of anatoxin, 205 failed to react to the test. This gives a proportion of 65.5% rendered unresponsive to the test with 1.5 cubic centimetres of anatoxin. In order to endeavour to procure a higher percentage of no reactions, it appeared advisable to give all children 2.5 cubic centimetres of anatoxin in three doses at three-weekly intervals and, wherever possible, this procedure has been followed since. It is interesting to contrast the proportion rendered unresponsive to the test by 1.5 cubic centimetres of anatoxin in this series of 313 retests (65.5%), performed after an interval of many months, with Dr. Moore's series of 533 retests two months after a full course of toxin-antitoxin mixture (57%), and with his further series of 326 retests four months afterwards (96.3%).

In 1934 immunization was continued and a special effort was made to include more children of pre-school age. Four hundred and twenty-six individuals were tested, the susceptibles were immunized, and 82 children were immunized without a preliminary test. In addition, 400 retests were made. The percentage of initial positive results to the tests was 55.8%. One hundred and eighty-five children received three doses of anatoxin, 44 received two doses, and 4 received one dose. Eighty-two of these had no initial test.

Retests have been completed in the case of a few children who have received three doses of anatoxin (2.5 cubic centimetres in all). Only one out of 52 children was Schick-positive on retesting, a proportion of 98% who gave no reaction. On the other hand, of a further batch of 137 children retested after two doses only, 88 gave no reaction to the Schick test—a proportion of 64.2%, a result very close to that of 65.5% in the previous year. All these retests were made approximately nine to twelve months after immunization was completed. It is seen that, whereas after a course of 1.5 cubic centimetres of anatoxin 65% of children are rendered unresponsive to the Schick test, in a small batch of 52 retests after a course of 2.5 cubic centimetres of anatoxin, in a sample of children of average school age, spread fairly uniformly over six grades, 98% were rendered unresponsive. For this reason the policy has been adopted of giving to all children a full course of 2.5 cubic centimetres of "Commonwealth" anatoxin, in doses of 0.5, 1.0 and 1.0 cubic centimetre at intervals of three weeks. A proportion of 65% rendered unresponsive to the Schick test with 1.5 cubic centimetres of anatoxin is considerably lower than figures quoted generally, which range from 80% to 90%. C. S. Barbour found 90.4% of 52 persons unresponsive to the Schick test after 1.5 cubic centimetres of anatoxin (Common-

wealth).<sup>(6)</sup> The low figure obtained in this city might be explained by the fact that, judged by morbidity and mortality figures for the city, we are here dealing with a highly susceptible population in comparison with those of larger cities, where most immunization work has been carried out. The child population in such a community as this might be termed rural in type, insufficiently urbanized to produce a more widespread development of naturally acquired immunity by exposure to infection.

In 56 instances retests at an interval of nine to twelve months were carried out on children who originally gave no reaction to the Schick test. In all but one case retesting showed the test still produced no reaction. Thus during the last three years 2,139 individuals have been attended to, 273 susceptibles have been immunized, as mentioned above, with three doses of anatoxin, 759 with two doses, and 46 have received one dose only of 0.5 cubic centimetre, the rest of the course not having been completed because of absence from school, sickness or change of address.

As in the 1923-1924 campaign, the total children presumably unresponsive to the Schick test represents not more than 25% of the child population. What effect, if any, has this work had on the local incidence of diphtheria?

It is generally held that where immunization covers only 25% of the child population, it is unlikely that any dramatic drop will result in the number of notified cases of diphtheria. Up till the present this is borne out by the figures for Bendigo, and it cannot be said that the work done has been sufficient materially to affect the incidence of diphtheria in the city. Table III shows the local incidence compared with that in the State of Victoria generally over a period of fifteen years. The rise and fall of incidence over the years coincide very closely.

TABLE III.

Period.	Victoria.		City of Bendigo.	
	Total Number of Cases Reported.	Number per 10,000 of Population.	Total Number of Cases Reported.	Number per 10,000 of Population.
1920-1924 ..	5,739	36.46	239	91.2
1925-1929 ..	3,176	18.38	60	22.9
1930 .....	3,414	19.13	77	29.2
1931 .....	5,434	30.23	109	41.6
1932 .....	7,322	40.54	353	134.7
1933 .....	6,564	36.05	244	96.2
1934 .....	5,490	29.98	101	39.8
1935 <sup>1</sup> .....			21	

<sup>1</sup> January to April.

The admission to hospital of cases of "diphtheria" from among those known not to react to the Schick test or among those who have been "immunized", is disconcerting to one who has carried out immunization work to any great extent. During the last two and a half years, since immunization with anatoxin began in Bendigo, no less than 24 of the total of 2,139 individuals covered in testing and immunizing



have been since admitted to hospital. In this connexion "immunization" is considered to consist of two or three doses of anatoxin followed by an interval of three months from the last injection. Of these, 15 had given no reaction to the Schick test at the time of testing, and only three returned a positive swab while in hospital, one of these being positive on first swabbing only, second and other swabs giving a negative result. All patients are swabbed on admission to hospital and two "negative" swabs are obtained before discharge. Although the absence of positive swabs in 12 out of 15 individuals who do not react to the Schick test is no proof that their throat affections were not diphtheria, neither is the presence of positive swabs in three of these proof of the presence of true diphtheria. However, it is suggestive that almost all of these non-reactors to the Schick test failed to return evidence of the presence of *Corynebacterium diphtheriae* in cultures from the throat during an attack simulating diphtheria after not less than three throat swabbings during the course of the illness. In eight of those admitted to hospital a Schick test had proved positive and "immunization" had been performed, and in one case no initial test had been made, but the child had been "immunized". Of these nine patients, all returned positive swabs in hospital. So that there is added evidence in the case of the "immunized" children that their attack probably was true diphtheria. In only two of these cases had there been given what I now consider to be a full course of anatoxin—2.5 cubic centimetres. Three of the nine "immunized" children did not react to the Schick test on being retested after their course of anatoxin. All of the 24 patients admitted to hospital gave a good response to antitoxin and completely recovered.

Apart from the question as to whether children since admitted to hospital suffered from diphtheria or not, it is interesting to compare the "chances" of admission to hospital of a child covered by Schick testing and/or immunization and a child among the remainder of the child population. Since the work began in 1932, 24 of the former, 1,952 in number, omitting "adults" over fifteen years, have thus been admitted to hospital, and 303 from the remainder of the child population (one to fifteen years), estimated to be approximately 5,500. So that only 1 in 81 of the former has been admitted to hospital, suspected of having diphtheria, compared with 1 in 17 of the latter.

In spite of the fact that schools have now been circularized regularly for three years, regular sessions have been held at the baby health centre, and nurses at the Base Hospital and children at a "toddlers'" institution have been immunized, it is extremely difficult to persuade parents to bring their children forward for immunization. Personal circulars by post were sent to mothers of children aged one to three years. In spite of publicity and the fact that over 2,000 children in the city had been attended to, more than 600 circulars elicited 17 consents!

The incidence of diphtheria at present is one-third of what it was two years ago, and it follows that a lower endemic rate for a time will produce a sense of false security. Meanwhile the numbers of children immunized year by year will fall until the disease breaks out in epidemic form again. While the decision for immunization rests with parents, it is doubtful whether more than 25% of children will ever be protected, even during times of epidemic, and while undoubtedly individual benefit is conferred, there will never be a large drop in the number of notified cases.

#### Summary.

1. Figures are given representing a high incidence of diphtheria in a provincial city.
2. Two isolated immunization campaigns are described, separated by an interval of ten years.
3. Among school children the proportion of reactors to the Schick test is 46% to 55%.
4. Immunization with toxin-antitoxin mixture in 1923-1924 rendered 57% in two months and 96.3% in four months unresponsive to the Schick test.
5. Immunization with anatoxin in 1932-1934 rendered in nine to twelve months only 64% to 65% of 400 children unresponsive to the Schick test with 1.5 cubic centimetres of anatoxin, and 98% of 52 children unresponsive with 2.5 cubic centimetres. I consider 2.5 cubic centimetres of "Commonwealth" anatoxin necessary for a full immunizing course.
6. In the 1932-1934 campaign only 25% of the child population have been covered, and there is no dramatic drop in incidence.
7. Nine "immunized" children afterwards developed diphtheria, and all recovered. Fifteen children who were originally non-reactors to the Schick test have been admitted to hospital as sufferers from diphtheria, but in 12 instances all swabs taken were "negative". Since immunization with anatoxin began, 1 in 17 of the unprotected portion of the child population has been admitted to hospital as diphtheria, but only 1 in 81 of the protected group.
8. Evidence of protection in the great majority of immunized children is shown, but the community is not yet adequately protected, as many parents are reluctant to allow their children to be immunized.

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- ③ *Ibidem*, page 49.
- ④ *Ibidem*, page 57.
- ⑤ *Ibidem*, page 60.
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## Reports of Cases.

### CORONARY OCCLUSION WITH UNUSUAL FEATURES.

By K. McK. DOIG, M.B., B.S. (Melbourne),

AND

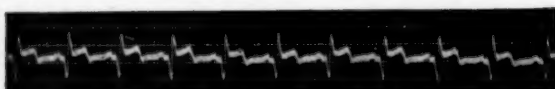
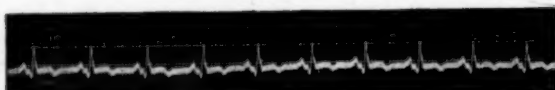
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THE following case of coronary occlusion is reported because it exhibits features not usually present in this malady, chief of which is the absence of the devastating pain, almost constantly associated with this condition.

The history is that of a man, fifty-seven years of age, who, two years ago, was told that he had a high blood pressure. He was a gardener, but his work was light, and in spite of, or perhaps because of, his raised blood pressure he felt well. On March 31 he went to bed and soon afterwards he experienced discomfort in the chest behind the sternum, and at the same time felt a tingling sensation going down both arms into the fingers. There was no dyspnoea and he ascribed the condition to indigestion. He realized, however, that there was something unusual and he sought medical aid.

On examination he was lying fairly comfortably in bed, but there was present a mental anxiety out of proportion to the findings. His heart was beating regularly and the sounds were clear. The apex beat was in the nipple line, the systolic blood pressure was 125 millimetres of mercury, and there was no tenderness in the upper part of the abdomen. He was ordered rest.

Although he felt that there was something wrong, he was not unduly alarmed and asked if it would be quite safe for him to ride his bicycle on the following day. After two days' rest in bed his condition remained unaltered and he was brought to hospital, where the more serious nature of his illness was



appreciated. He still complained of discomfort in his chest, his heart sounds were regular and clear, his pulse rate was 96, but his temperature was elevated to between 37.8° and 38.2° C. (100° and 101° F.) and the blood showed a leucocytosis of 21,000, the differential count being: immature neutrophil cells 20%, neutrophil cells 60%, lymphocytes 3%, monocytes 12%.

An electrocardiograph was taken and it is fairly characteristic of that obtained from patients suffering from coronary occlusion at this stage of the disease. It shows the plateau form as described by Pardee, where there is a deviation of the R-T period, which may start either above or below the iso-electric level. In the electrocardiograph obtained from this patient this abnormality is best seen in Lead III.

With complete rest in bed and careful nursing this patient seemed to be doing well, but on the eighth day of his illness severe pain manifested itself behind the sternum, and the patient was in a state bordering on collapse. The pulse was regular, but very rapid and weak,

he was pale and haggard and sweating, and morphine had to be given to relieve the pain. Four hours later death took place. This fatal attack of pain seemed to suggest that a more complete occlusion took place then, or that rupture had occurred. Unfortunately, no *post mortem* examination was obtainable.

The unusual features exhibited here are:

1. Absence of the severe pain at the onset of the attack. Lewis states that cases do occur in which pain is mild or absent, and he says that diagnosis will depend mainly on having in mind always the possibility of occlusion. East and Bain have reported eight cases without pain, and they state further that the absence of pain does not seem to depend on the size of the infarct.

2. Absence of dyspnoea. The patient was never obviously dyspnoeic, and when asked if he was short-winded at all, said that he thought he might be a little that way. Dyspnoea is generally held to be even a more constant symptom than pain, and although there may have been a little with this patient, it was never an outstanding feature.

3. Absence of rhythmical disturbances. This is not such a very unusual feature, as several cases have been reported in which the heart sounds have remained regular throughout.

4. The fatal attack of pain on the eighth day, which appeared to be more like the onset of a coronary occlusion.

## Reviews.

### DISEASES OF THE EYE.

MAY AND WORTH'S "Manual of Diseases of the Eye" is so well known in Australia that it needs no introduction.<sup>1</sup> It is less than five years since its sixth edition was reviewed in these columns and now its seventh edition has come to hand. If further proof of its well deserved popularity is required we need only recall that the thirteenth American edition appeared in 1930, and was reprinted in 1932 and in 1933, and a new edition was published in 1934; last year the third Chinese, the sixth Italian and the ninth Spanish editions were found to be necessary to meet the international demand.

In the seventh edition greater attention is paid to pathology than in the earlier editions. Though new sections have been added and certain old descriptions have been rewritten to bring them into line with new methods of treatment and the latest conceptions of certain diseases based on modern research, yet the book is kept to a convenient size, which adds to its utility to the general practitioner. The original intention of the authors to write for such practitioners and medical students has been observed throughout each edition in a manner that is too rare in books that have been on the market for twenty years.

### FRENCH MEDICINE.

MM. LAIGNEL-LAVASTINE and RAYMOND MOLINERY have made an attempt to compress a history of French medicine into the compass of 168 pages.<sup>2</sup> It cannot be said that the endeavour has been successful, for the subject matter is so condensed that the volume resembles a guide book or a catalogue in style. Great names, such as that of Bichat, are dismissed with scarcely more than a ten-line paragraph. Laennec and Pasteur in a page or so. Ambroise Paré's life and deeds are recorded in exactly sixty-eight lines. No real student of medicine could be attracted by information presented in this jerky, squirting manner. It seems incredible that a market should exist for such literature. The book has been translated from the original French by Professor E. B. Krumbhaar.

<sup>1</sup> "A Manual of Diseases of the Eye", by C. H. May, M.D., and C. Worth, F.R.C.S.; Seventh Edition, extensively revised by M. L. Hine, M.D., F.R.C.S.; 1934. London: Baillière, Tindall and Cox. Demy 8vo., pp. 515, with 350 illustrations and 23 plates. Price: 15s. net.

<sup>2</sup> "French Medicine", by M. Laignel-Lavastine and M. Raymond Molinery; 1934. New York: Paul B. Hoeber. Foolscep 8vo., pp. 187, with illustrations. Price: \$2.50.

## The Medical Journal of Australia

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### THE ELIMINATION OF SYPHILIS.

A FEW weeks ago the unsolved problems in connexion with syphilis were discussed in these pages under the title of "Syphilis the Unknown". On that occasion the opinion of Kinnier Wilson was quoted to the effect that it would be difficult to find another instance in which research crowned by the detection of the apparently causative organism had started more problems than it had settled, and in which uncertainties still gathered round a question imagined decades ago to have been solved. This quotation was followed by a discussion of some of the aspects of syphilis that are still wrapped in mystery, and the opinion was expressed that reviewal of the present position ought to bring a lively discontent and a desire to stimulate research. The other aspect is worth considering. Much is known about syphilis. We know how to recognize the causative organism. We know how this organism may be handed on from one person to another, either by contagion or by transmission through the placenta. We know that once this organism has become established in the blood, it induces certain changes that may in practically

every instance be recognized by certain laboratory tests. We know that intensive treatment, particularly when undertaken early enough, will destroy the causative organism in the tissues and as a rule restore them to their former healthy state. We also know that the absence of syphilitic organisms from the tissues is generally recognizable by laboratory methods. Finally, we know that syphilis still flourishes and that all that might be done for its elimination is not done. If what is not known should breed a lively discontent, what is not done for its elimination in the light of what is known should give rise to self-recrimination and a determination to make good the deficiencies.

If syphilis is to be eliminated from the community, it must be attacked from the point of view of prevention as well as of cure. The subject of prevention is enormous. Certain groups of social workers will lay emphasis on the need for personal prophylaxis, and this is without doubt of the utmost importance. This aspect can be taught by both health departments and medical practitioners. But it involves much more. It has been computed that probably half the syphilis in the community is caused either by the infection of one married partner by the other, or by the transference of the infection to the infant. Most of this infection could be eliminated if wider use were made of laboratory methods of examination. In certain obstetric hospitals the Wassermann test is performed in all cases as a routine measure. If the routine use of this test were extended to other types of hospital and in the practice of private practitioners, it would be possible to prevent a large number of infections. A syphilitic partner to a marriage could be discovered before the other partner became infected and before pregnancy occurred. When infection had occurred, treatment could be given. If in addition to the use of the Wassermann test in medical practice, certification of health were made a necessary precedent to marriage, practically half the syphilis in the community could on this basis be eliminated.

In regard to the remaining infections the difficulty is greater. The difficulty arises in bringing infected



persons to the medical practitioner. Were the complete acts dealing with venereal disease that are on the statute books of some of the Australian States rigidly enforced in all the States, a great deal might be effected. The difficulty arises very often in bringing infected persons to the medical practitioner (according to the ideal venereal diseases act, none but a medical practitioner is allowed to treat venereal disease). Here we are faced again with the education of the public in health matters. This is primarily the function of the health authority, but it is not the duty of the health authority alone. Every medical practitioner has his or her share in this work. To create public interest would be easier if venereal disease were an acute and lethal complaint. For example, the populace becomes thoroughly aroused at an outbreak of acute poliomyelitis or of virulent diphtheria; it appears to be quite complacent about the enormous ill-effects, vascular, neurological and visceral, that syphilis leaves in its train. Were an actuarial investigation into the question possible, it would most likely be found that syphilis in all its ramifications is more costly to the community than any other disease or condition that affects it. This point could with advantage be stressed. Every device that will focus the attention of the public on the immediate and remote effects of syphilis must be adopted.

### Current Comment.

#### THE TREATMENT OF PERNICIOUS ANÆMIA.

IN reply to the gibe that medicine, considered as an agency for the betterment of the human race, has lagged far behind the other sciences, many achievements may be quoted. We may reflect, as an instance, upon the altered position in the control of deficiency disorders. Less than a decade ago the great clinician, Richard Cabot, reviewed the position so far as the treatment of pernicious anæmia was concerned. Arsenic, he said, was the drug upon which the majority of physicians then relied, but he himself distrusted it, and had known it to produce, not only no benefit, but positively harmful results. In like manner he spurned atoxyl and sodium cacodylate. Oxygen inhalations he found useless, iron preparations of little value, and the

swallowing of bone marrow a waste of time. Cabot had known of cases of pernicious anæmia in which the transfusion of blood, uncertainly done and with poor technique, had lessened his despair to an extent. But not until he became aware of the work (not yet officially published) of Murphy and Minot could Cabot feel faintly hopeful about the treatment of pernicious anæmia. Using whole liver, he treated forty-five patients with strikingly good effect; but even then he was driven to wonder whether a permanent cure had been effected, whether the favourable remissions would last. We know much more about the whole matter now; thousands of patients with pernicious anæmia have been given intensive treatment for nearly ten years, and many have felt the need for a therapeutic stock-taking. Impelled by this need, John F. Wilkinson<sup>1</sup> has written an informative paper which embodies the results of his treatment since the year 1926. He points out that although pernicious anæmia may appear plainly as a general disease of the blood, yet it may closely imitate, without very obvious blood involvement, some disease of the gastrointestinal tube, of the gall-bladder or of the nervous system; and it may be simulated very exactly as a result of malignant growth.

The mechanism of the manufacture of red blood cells depends primarily on the digestion of food in the stomach by hydrochloric acid and some important enzymes. Of these latter the chief is known as hæmopoietin; its interaction with an unknown food constituent, not yet isolated, gives birth to an anti-anæmic body. This in turn is borne by the intestinal blood stream to the liver, there to be stored and served up as required in this part of the hæmopoietic apparatus. A failure at any stage in the working of this complex machinery promptly bars proper and constant red cell formation in the marrow. Thus, if the gastric mucosa be badly damaged, as in *achylia gastrica*, in conditions of under-feeding or of chronic starvation, there is total want of the extrinsic food factor. Further, a set of conditions productive of permanently alkaline stomach contents, by creating a stoppage of normal gastric secretion, will inevitably prevent the production of the anti-anæmic principle. At the other end of the chain the liver itself may be helpless to store the principle or to use it at all—a state of affairs which is thought to be the active cause of the so-called achrestic anæmia described by Israels and by Wilkinson himself. As something of an analogy, the hæmolytic anæmia of pregnancy is now thought to be due to a relative paucity of anti-anæmic bodies, present in too little amount to meet the huge demands of the gravid state.

It is now certain that a macrocytic anæmia of the so-called Addisonian type is in all respects a true deficiency disease, and one which demands lifelong treatment and observation if life is to continue, provided, of course, that no primary (and removable) first cause of the anæmia is recognized and dealt with. Nor can the disease always be

<sup>1</sup> *The Practitioner*, March, 1935.

controlled by observation of the blood picture alone. Such classical signs as diarrhoea, glossitis and abnormal spinal reflexes are warnings as serious as a low blood count itself.

As has been stated, the effective treatment of pernicious anaemia is nearly ten years old; and the fact is patent that this treatment must continue indefinitely if the patient is to live. In other words, a maintenance dose of some suitable preparation, varying with individual requirements and idiosyncrasy, and even with the time of year, must be worked out in each case. When Murphy and Minot first commenced the fresh liver therapy, patients were required to eat one half-pound of the gland each day. But not only was this amount too little, especially for such as suffered from involvement of the spinal cord (and they mostly required at least twice the stated quantity), but other serious troubles had to be met. Physicians soon discovered that their patients either could not obtain or would not eat the liver—it was sometimes unprocurable, and usually unpalatable. Further, investigators soon questioned whether other evils might not follow the ingestion of such large masses of protein, much of it inactive so far as relief of the disease was concerned. These considerations led to the production of active extracts of small bulk, intended for administration orally or parenterally. The production of these substances has reached a peak only during the past three years, and has supplanted the older fresh liver therapy. Such extracts have the merit of cheapness and are very active. They fail only when the anaemia follows either a breakdown in the absorptive power of the alimentary system or (when given by the oral route) a lack of cooperation on the part of the patient. Otherwise, they act like a charm, especially when the blood count is low. They enable the clinician largely to dispense with the need for blood transfusion, and often cause a rapid rise of the reticulocytes within thirty-six hours. This event often takes place even after the administration parenterally of only twelve to sixteen cubic centimetres of certain reliable preparations, given in two-hourly doses of two cubic centimetres. It is then safe and expedient, even where the patient was originally comatose, to cease the treatment for two or three days while checking the decline of the reticulocyte crisis. As has been emphasized recently in these pages, however, not all commercial extracts are to be trusted; some products are sub-potent or completely inactive. The physician, therefore, should employ only those which have been subjected to careful clinical tests. The patient being free from signs and symptoms of evil import, and his blood picture normal, intramuscular medication in doses of two to four cubic centimetres should continue at intervals of a week. Later, such doses may be needed only after the lapse of as long a time as six weeks. Wilkinson believes that extract of pig's stomach, given by mouth and combined with intravenous injections, produces the most favourable results in cases of spinal and neural lesions. In a series of 400 patients, in whom the diagnosis of pernicious anaemia was beyond question, Wilkinson

carefully observed the end-results of treatment with this extract. During five and a half years 95% of them have remained well. He has noted the usually quick return to a normal blood count, the disappearance of signs and symptoms of peripheral neuritis, and other nervous disorders. In many of these people he has been able to discontinue treatment for months at a stretch, aiming always to maintain the red cell count. A noteworthy point in treatment is that extracts, given orally, should never be warmed; they should be taken in cold fluids or foods; and active treatment is always necessary if the patient is the victim of some intercurrent infection. Contrasted with modern methods in treatment, there seem few of the older agents of cure which can achieve very much. Hydrochloric acid is of use against diarrhoea, glossitis and dyspepsia; Bland's pills seem useful if, during a rapid remission, the colour index falls greatly below unity. But the day seems to be dawning when blood transfusion for the relief of these patients will be a procedure of the past, when they will consume a normal diet from the very moment almost that effective treatment begins, and when their nervous and mental upsets will be as capable of adjustment as their blood counts.

#### DRUGS AS RESPIRATORY STIMULANTS.

A. MONCRIEFF, in the Goulstonian Lectures for 1935, has dealt exhaustively with respiratory failure, including the so-called *asphyxia neonatorum*. He considers the aetiology and measurement of such failure, and concludes with methods of treatment.<sup>1</sup> Moncrieff mentions that the biblical story of Elisha and the Shumanite's child vividly illustrated a method of resuscitation still in use. He discusses artificial respiration, being a firm advocate for Schäfer's method, and also inhalation therapy by oxygen and carbon dioxide, clearly demonstrating their limitations. Moncrieff critically examines drugs as respiratory stimulants, and states that the ideal respiratory stimulant has not yet been prepared. It should have a selective and prolonged action on the respiratory centres, with no secondary depression. It should not prejudicially affect other tissues or systems, and the toxic should be far removed from the therapeutic dose. The drug should be reliable and able to stimulate even a severely poisoned centre. Moncrieff insists that no drug will ever be a substitute, in respiratory failure, for prompt action as regards removal of any obstruction and performance of artificial respiration. Y. Henderson has said that, in asphyxia, all subcutaneous, intravenous or intracardiac medication is harmful rather than beneficial, and that respiratory stimulants are generally cardiac depressants. Moncrieff stresses the point that in all experiments with respiratory stimulant drugs it is important to record the blood pressure as well as respiration, and to test the drug not only on an animal with normal

<sup>1</sup> *The Lancet*, March 23, 1935.

respiration, but also after this centre has been damaged or depressed, as by morphine. Mere tracings of the respiration before and after administration of any drug do not reveal the whole truth. Tests can be made on human patients in a way closely similar to laboratory experiments. Moncrieff and his colleagues did this when treating patients suffering from the effects of morphine and other sedative drugs, taken with suicidal intent. Oxygen was administered from a recording spirometer apparatus, with a mask strapped over the face. The breathing was recorded on a revolving drum and the effects of certain drugs were noted. Except in the moribund, definite stimulation of breathing was always obtained by allowing carbon dioxide to accumulate, and also by lobeline and other drugs. The most striking feature of the tests was the complete absence of any regular stimulant effect on respiration by strychnine, caffeine, atropine, pituitrin or adrenaline. Occasionally a phase of irregular breathing followed adrenaline.

The pharmacological action of lobeline, which is a member of the nicotine series, is essentially depressant, with ultimate paralysis of certain nerve cells and motor nerve endings. But intravenous injection is followed by a brief period of the opposite effect, that is, stimulation, in which nervous control of respiration shares. F. R. Curtis and S. Wright, from animal experiments, concluded that lobeline was a powerful respiratory stimulant, but that doses necessary to produce increased breathing have profound other effects, such as cardiac depression. They suggested that it would be safer if combined with a circulatory stimulant. Moncrieff's own clinical and laboratory experience confirms that view, especially in respiratory failure in the new-born. Lobeline certainly stimulates respiration, but depressant after-effects are not uncommon. S. W. Lee has reported two cases of generalized twitchings, rigidity and opisthotonus in babies after lobeline, but with subsequent recovery. A. Oberbeck, however, proclaims the value of  $\alpha$ -lobeline in respiratory failure of the new-born, advising a dose of three milligrammes. Moncrieff suggests that it be used only in extreme emergency and that one single dose be given and in no case repeated before twelve hours. It should be followed as soon as possible by measures to combat circulatory depression.

"Icoral" (Bayer) is a solution of two synthetic bases; one like lobeline, with a central stimulant effect on respiration, and the other stimulating the cardio-vascular system like adrenaline. It is designed to overcome the risks of lobeline. From Eckstein's clinic in Germany come favourable reports of its value in respiratory failure in the new-born. H. Frank mentions its use in adults, especially those whose respiratory centre is poisoned by morphine, barbiturates or carbon monoxide. Moncrieff experimented on decerebrate cats and animals poisoned by morphine. He found that a stimulant effect on respiration varied very greatly, at times being only slight. When "Icoral" failed,

carbon dioxide inhalation would improve the breathing. Not infrequently there appeared an "adrenaline apnoea" effect—a rise of blood pressure followed by cessation of breathing for twenty or thirty seconds. This might be succeeded by stimulation of respiration or by irregular or periodic breathing. There seemed to be no depressant after-effects on the circulation. Apnoea is a possible danger when the drug is used intravenously, but, clinically, such has not been observed after intramuscular use. It might occur with larger doses. Moncrieff's impression is that "Icoral" is relatively safe in the dose advised for small children, but that the results vary greatly, and so the drug is unreliable.

"Coramine" is a synthetic preparation with an action closely resembling that of camphor, but reputed to be superior to camphor in its effect on the heart and as an antidote to morphine. Its value in *asphyxia neonatorum* and narcotic poisoning has been claimed. Moncrieff makes no mention of camphor, but he compared the effects of "Coramine" on a morphinized animal with those of lobeline, "Icoral" and carbon dioxide. His results showed that "Coramine" was a respiratory stimulant and had no preliminary apnoeic effect; but its experimental intravenous use, in doses comparable with those advised for the new-born, occasionally produced general convulsions and that some twitching was rarely absent. Moncrieff found that its clinical use in the new-born often induced restlessness, but twitchings or convulsions were not seen. "Coramine" is a powerful respiratory stimulant, especially valuable when the centre is depressed and without danger of circulatory depression. The convulsant is far greater than the therapeutic dose, but Moncrieff thinks that there may be some danger of excessive stimulation of the nervous system as a whole.

"Metrazol" has been extolled as a respiratory stimulant. Critical experimental investigation is necessary to determine its value, if any. As Moncrieff points out, we have not yet found the ideal respiratory stimulant. Anaesthetists particularly would welcome one for respiratory failure occurring during anaesthesia. Lobeline has been too often followed by disquieting manifestations.

#### MENTAL DEFICIENCY.

It will be recollected by those interested in the subject of mental deficiency that in the year 1932 a committee of the British Medical Association and a body styled the Departmental Committee on Sterilization each presented an important report. The Departmental Committee gave it as its conviction that hereditary factors are of paramount consequence in the production of mental defect, but the representatives of the British Medical Association differed strongly from this view. They stated in plain terms that while heredity must be admitted as an aetiological factor, there is as yet no sufficient body of evidence available to permit any-



body to determine in what proportion of such defects heredity is the primary cause.

According to Leonard Findlay<sup>1</sup> the cause of this divergence in expert opinion is not far to seek. He considers that the main reason for the lack of agreement is the accepted assumption that mental deficiency is merely the expression of variations in normal intelligence; and that, as a corollary, all varieties of mental defect, with their very various physiological accompaniments, may be collected into one group for analysis. While it is true that subnormal intelligence is the most obvious feature of the disorder, it may be questioned whether all deficiency may be traced to pure variations of that intelligence. Amongst high grade defectives, impairment of intelligence is commonly the sole departure from normal physiological function, and the belief is now widely held that intelligence is, in fact, hereditary; but amongst the low-grade defectives, a mere 30% of the number are found to suffer from mental abnormality alone; the remaining 70% manifest serious bodily changes in no way connected with intellectual function. It therefore appears that to include in a single group (as the Departmental Committee did, but as the British Medical Committee did not) the defectives of all grades, is likely to vitiate the results of group analysis, so producing confusion of opinion as to the incidence of any type of defect in the population as a whole.

Findlay has therefore analysed, over a period of twenty years, a group of 256 low-grade defectives, all drawn from his private practice. His findings appear to agree in the main with those of Dr. John Thomson who, in 1924, published the results of a much wider investigation on both private and hospital patients. Findlay has centred his attention only upon cases of congenital mental deficiency, leaving out of the question all defects acquired as the result of syphilis, encephalitis and hydrocephalus. The statistics appear to show that in only one instance did low-grade mental deficiency occur twice in the same family. Epilepsy, above all, is the disease in which a history of the same condition is discovered in some relative (9.5%) and in which there is a family history of some kind of nervous disease. In spastic diplegia, associated with mental defect, it is excessively rare to find traces of a similar disorder, or, indeed, of any other mental defect in a relative. It has been said by McNeil that the parents of mentally defective children are usually people of average and more than average intelligence; and Findlay believes, with Penrose, that defective parents rarely produce defective children. This may be considered as evidence that the trouble is not of a dominant character, and is against the idea that the condition must be due to the transmission of such character. Some months ago, too, Penrose presented figures in support of his contention that mental defectives are not unduly fertile; and he and Fernald have since stated that 30% of such people are childless.

It has been asserted by some that the ailment is of the nature of a recessive characteristic; but if that were so, it would be less likely to appear in the children, unless as a result of the union of two "carriers", an improbable contingency. Regarding the supposed perils inherent in the marriage of cousins, Findlay found only one instance of consanguinity; here, too, the child concerned was the firstborn, and there was unimpeachable evidence of a protracted and difficult labour. It cannot be said that the incidence of mental deficiency following such marriages is higher than that in the population generally.

Little, in 1862, first announced the belief that serious cerebral damage results from injury to the child at birth, and that 75% of cases of spastic paraplegia result from hæmorrhages occurring during labour. Findlay's figures demonstrate that in conditions of amentia with spastic diplegia or hemiplegia, the incidence of difficult labour is between five and ten times greater than among the physically sound. His tables show that in 51.2% of such cases there was a history of difficult birth and of probable damage to the brain, and that in 45% of these, instruments were employed. In not one example of the birth of a normally sound child was the mother below the age of twenty years; the average age was determined to be twenty-five to thirty-five years at the time of confinement. When difficult births occurred, followed by amentia and spastic diplegia or hemiplegia, the bulk of the mothers were under twenty or over thirty-five years of age. In cases of Mongolian idiocy, 50% of the mothers were over thirty-five years old, and 5.6% over forty-five. Findlay also found that the fathers of mental defectives tend to be somewhat older than their wives, and also that the fathers of such children are, on the average, older than those of normal children. In the group of Mongols examined (and this condition is not now thought to be hereditary) 63% of the male parents were above the age of thirty-five.

Summing up his conclusions, Findlay can find little support for the view that heredity plays an important part in the production of mental deficiency, but that injury at birth is a factor of tremendous importance in its production. If his views are to be accepted, a long period must yet elapse before sterilization of the unfit can be adopted as a mass procedure likely to reduce the total number of mental defectives in the community. The effects, good or ill, of such procedures in certain other countries are not known with any certainty; and it would not be the part of wisdom, even if such a course were legal, to embark upon a large scale operative campaign based, perhaps, on incomplete knowledge. Some time ago Robert Hutchinson said that he for one did not believe that mental deficiency was any more inherited than a hare-lip. It appeared to him to arise as a sport or accidental variation, and that more than one such case was rare in a family. To him mental deficiency appeared to be mainly a matter of luck. There are many, of course, who do not agree with him.

<sup>1</sup> *The Lancet*, March 9, 1935.

## Abstracts from Current Medical Literature.

### BACTERIOLOGY AND IMMUNOLOGY.

#### Egg Albumen Medium for the Cultivation of the Gonococcus.

I. N. ORPWOOD PRICE (*The Journal of Pathology and Bacteriology*, March, 1935) recommends the use of egg albumen medium in the cultivation of the gonococcus. The medium is pale straw-coloured, transparent and firm, and the gonococcus will flourish on it in spite of the presence of other organisms. The medium can be sterilized by heat, growth on it is rapid, autolysis is not hastened, and the organisms remain viable for seven to ten days at 35° C. The antigenic properties of the gonococcus are unchanged and the oxidase reaction is unusually definite. The author also states that in his experience a more abundant growth of gonococci on any medium is obtained if after inoculation the tip of the cotton wool plug is replaced in the tube while smouldering. The details of the preparation of the medium are as follows: (1) Production of the egg solution. (a) From egg albumen flake. To 100 cubic centimetres of distilled water in an Erlenmeyer flask add ten grammes of egg flake and place in the 37.5° C. incubator overnight. Next morning add 12.5 cubic centimetres of normal sodium hydroxide, and after thorough mixing place in the steamer for two to three hours. Filter whilst hot, first through lint and then through Chardin filter paper. Reduce the pH of the clear straw-coloured fluid thus obtained to 7.3. After sterilization by heat the solution is ready for use. (b) From egg albumen powder. Mix ten grammes of egg albumen powder with 100 cubic centimetres of distilled water into a smooth paste, avoiding the formation of lumps. Transfer this mixture to an Erlenmeyer flask and treat as in (a). (c) Mix 60 cubic centimetres of egg white with 40 cubic centimetres of distilled water in an Erlenmeyer flask and 10 cubic centimetres of normal sodium hydroxide. Steam, filter and adjust as in (a). These three solutions give equally good results, but for ease in preparation the author recommends the use of egg albumen flake. (2) Production of the agar broth. Take a bullock's heart stripped of fat, mince and add one cubic centimetre of tap water per gramme of mince. Allow the mixture to stand in the ice chest for forty-eight hours, filter, and to the filtrate add 2% peptone and 1% acid sodium phosphate. Steam for forty-five minutes, shaking at the end of twenty minutes. Filter through Chardin filter paper, adjust to pH 9.5 (faintly blue to thymol phthalein), and place in the steamer to throw out phosphates which are removed by further filtration through Chardin

paper. Adjust to pH 8.0. This constitutes double strength broth. Add equal volumes of this broth and 5% agar, mix thoroughly and reduce the temperature to under 56° C. before adding egg white (18 grammes of egg flake or the white of three eggs per litre). Steam for ninety minutes and filter through Chardin paper in the steamer. (3) Addition of the egg solution to the agar broth. To eighty cubic centimetres of the hot agar broth add twenty cubic centimetres of the egg solution, mix well, and tube five cubic centimetres per tube. After tubing, steam for twenty minutes on two successive days.

#### The Bactericidal and Antiseptic Action of Preservatives.

CAROLYN ROSENSTEIN AND IDA LEVIN (*American Journal of Hygiene*, March, 1935) studied contaminants found in routine testing of biological products and the action of two preservatives, phenol and merthiolate. The latter is described as a highly soluble germicide of low toxicity, non-precipitable and non-coagulable, and capable of manifesting germicidal and inhibitory action in protein solutions. For the most part 0.5% phenol or 0.3% to 0.4% tricresol was used in the observations recorded, but for some time merthiolate had been employed in a dilution of one in ten thousand in diphtheria toxoid preparations. The three types of organisms most frequently encountered as accidental contaminants were staphylococci, *Bacillus pyocyaneus* and diphtheroids. In choosing a preservative to be used in any one biological product the following factors must be considered: the character of the product, the concentration of the preservative, the manner in which the preservative is to be used, the temperature at which the product is to be stored, and the length of time of storage. It was found that the results of the action of the preservatives on staphylococci were uniform and both preservatives destroyed this organism in toxins, antitoxic globulins and antisera. In the case of *Bacillus pyocyaneus* and of the diphtheroids, however, the problem became more complex. Both preservatives destroyed these organisms in toxins, but in the antitoxic globulins and antisera *Bacillus pyocyaneus* flourished in merthiolate, but was destroyed with 0.5% phenol, while the reverse action was noted with diphtheroids. Either of these contaminants, however, was destroyed by adding a combination of both preservatives, the amount of each being one-half of that used singly. It was noted that the efficiency of phenol and tricresol against all three organisms decreases during ten months' storage at 5° C.; that the efficiency of merthiolate or of the combination of phenol and merthiolate is apparently unimpaired during ten months' storage at 5° C. The bactericidal action of preservatives is generally retarded by storage at very low temperatures. It was noted that

the efficiency of the preservative varies with the character of the product, and that the maximum effect on the organism is usually reached in forty-eight hours. The authors recommend the use of both solid and liquid media in testing biological products for possible contaminants.

#### Acute Stomatitis Associated with Leucopenia.

D. K. MILLER AND C. P. RHOADS (*Journal of Experimental Medicine*, February, 1935) noted, during the course of a study of chronic black tongue in dogs, that in animals dying of an acute form of the disease a leucopenia associated with the acute stomatitis was produced. In certain cases the appearance of the oral lesions was strikingly similar to that seen in acute agranulocytosis in human beings. The dogs were fed on the modified Goldberger black-tongue-producing diet described by Rhoads and Miller, of which the details are given. Samples of blood were taken at regular intervals and necropsies were performed on all animals. Ten animals which developed an acute febrile disease with stomatitis, leucopenia, granulopenia and lesions of the bone marrow were investigated. Four developed symptoms after one hundred and forty days of experimental feeding; others developed symptoms in less than one hundred days. In two leucopenia accompanied the first attack of stomatitis; in others it occurred only in later attacks. In all the leucopenia was observed with or after the onset of the mouth lesions. No evidence was forthcoming to suggest that the leucopenia preceded the stomatitis. Four of the dogs recovered from the first attack of leucopenia, and of these, two died in a second attack; one subsequently developed stomatitis which terminated fatally without leucopenia. The lesions developed on lips, floor of mouth or cheeks, and showed injection followed by superficial ulceration and necrosis; at death gangrene of a large part of the tonsillar fossa or floor of the mouth had frequently occurred. The odour was very fetid and salivation marked. Spirochaetes and fusiform bacilli similar to the organisms recovered in human beings were present, often in large numbers. Masses of these organisms were injected into and under the gingival and buccal membranes of normal dogs without producing any lesion. All the animals were ill from the time of onset of the stomatitis, with temperatures frequently reaching 40° to 40.5° C. (104° to 105° F.). Death usually occurred two or three days after the appearance of well defined lesions. The leucopenia was pronounced, and although in no case was there a complete absence of polymorphonuclear cells, a marked decrease was always noted. The average total leucocyte count of all animals before symptoms was 11,146 per cubic millimetre, and during attacks the average fell to 1,927



per cubic millimetre. Before onset the average absolute polymorphonuclear count was 9,100 per cubic millimetre, and during attacks the average fell to 1,135 per cubic millimetre. The lowest total white cell count was 1,250 per cubic millimetre, and the lowest absolute polymorphonuclear count was 360 per cubic millimetre. The histological changes noted in the bone marrow included dilatation of the capillaries and cessation of maturation of the haemopoietic process, and the same picture was presented as is seen in granulopenia experimentally produced by the administration of some toxic substances belonging to the group of aromatic compounds.

## HYGIENE.

### Breast Cancer.

EMIL BOGEN (*American Journal of Public Health*, March, 1935) writes that in certain of the United States of America, dealing with nearly 117 million persons, the 1930 census figures give a progressively increasing specific death rate, ranging from 16 per million at the decade 25-34, 87 at 35-44, 214, 363, 462 and 736 in successive decades up to 75 and over. This may not be realized, as the number of older females diminishes, so that of all cancer cases the maxima are at 45-54 (247) and 55-64 (271). Most of the recent rise in the United States of America is due to the increasing proportion of older persons in the population. The table given shows definite increases in succeeding censuses for the age groups 45-64 and 65 and over. The Metropolitan Life Insurance Company, industrial department, gives a slight reduction in breast cancer death rates under 44, 0.09 yearly, and a more definite increase, 0.42 per 1,000, over 45. The reduction in lower ages may perhaps be referable to prolongation of life by surgical and radiation therapy. Diagnosis and increased medical service increase the recognition of cancers in inaccessible sites, but accessible cancers (breast cancer) share but little in this recognition. As, however, the proportion of breast to all cancers remains the same, breast cancer must be increasing—double the figure for 1900. The proportion varies in different countries; England has the highest, 292 per million females; New Zealand, 204; United States of America, 176; Australia, 165; Italy, 60; Japan, 18. This is not entirely a matter of age and sex distribution, of registration or of diagnosis. In the United States of America it is higher in urban than rural, in the north than in the south, in whites than in negroes, though differences are reduced by statistical conclusions. The higher proportion of breast cancer in the single than in the married, in *nulliparae* than *multiparae*, may account for the general inverse ratio of breast

cancer rate and the birth rate. Child-bearing and lactation prevent breast cancer, so that we may expect a rise with falling birth rates and early weaning. This holds true for States in the United States of America as well as various countries in the world.

### Benign Tertian Malaria: Natural Refractoriness in a Caucasian to Inoculation with Plasmodium Vivax.

M. F. BOYD, W. K. STRATMAN-THOMAS AND S. F. KITCHEN (*American Journal of Hygiene*, March, 1935) report that a white male, aged forty years, had had several attacks of malaria during the past six years. Early paresis was noted and malaria therapy was attempted. Inoculation with a single gland-positive mosquito (McCoy, vivax), effective in two other cases, proved ineffective; similarly inoculation with three infective mosquitoes seven months later failed. A year later ten positive mosquitoes of the same vivax strain gave negative results. Two months later three positive mosquitoes carrying Steadman's strain of vivax gave a febrile result not exceeding 37.8° C. (100° F.), and parasites appeared in the blood for six days in low density. This latter strain is of no value in therapy. Homologous tolerance to the McCoy strain of *Plasmodium vivax* was demonstrated and there were sufficient heterologous qualities to suppress the reaction to Steadman's strain.

### The Response of the Peritoneal Tissue to Dust.

R. R. SAYERS, J. W. MILLER AND W. P. YANT (*American Journal of Public Health*, April, 1935) report that intraperitoneal injection of dust into guinea-pigs at the Pittsburgh United States Bureau of Mines Experiment Station demonstrates that live animal tissue in any part of the body reacts essentially in the same way to foreign bodies; and quartz produces fibrous tissue in the peritoneal cavity, but not limestone or coal. Intraperitoneal injection produces identical reactions to inhalation, but can be more accurately handled quantitatively and kept sterile. Its reactions are more rapid, dust nodules resulting in from one to three weeks. Dust may gradually disappear without scar tissue being found (absorptive), nodules may form, enlarge and become fibrous (proliferative), while no absorption and limited nodular formation may occur (inert). Particle size was limited to 43 microns as the maximum (325 standard mesh sieve). By air separation, particles varying in size from 0.75 $\mu$  to 1.7 $\mu$  (soapstone 3.5 $\mu$ ) were obtained. These resemble inhaled dusts. Two cubic centimetres of a 10% suspension of dust, sterilized in a hot air oven at 150° C. for one hour, were injected intraperitoneally into each guinea-pig. The pigs were examined 7, 14, 30, 56, 90, 180 and 360 days later. The dust

was found mainly in the anterior abdominal (dependent) wall, next heaviest in the omentum, but dispersed collections and nodules occurred on the mesentery, liver, intestines, testes or uterus, and the diaphragm, and even on the posterior wall. Bituminous coal, however, was chiefly found in the omentum and mesentery, with but little on the anterior abdominal wall. A list of dusts and responses is given. Cement, calcite, gypsum, limestone (calcium salts) gave absorptive results, nodules forming, but disappearing, leaving usually some brown pigment but no scar tissue. With quartz and chert (siliceous) the nodules increased and fused together, up to 90 days after injection. At the end of 360 days induration and fibrosis were present. Soapstone (half silica, one-fourth magnesium oxide), carborundum (silicon carbide), hematite (jewellers' rouge, ferric oxide), anthracite coal (only 5% quartz and calcite), bituminous coal (8% ash, up to 3.5% silica), and precipitator ash (glass *et cetera*), proved inert. Little reaction occurred, and the amount 360 days later was similar to that at seven days, though the distribution altered. The authors claim this peritoneal tissue response as a test of possible harmfulness of an industrial dust.

### Bacterial Purification Rates in Polluted Water.

J. K. HOSKINS (*American Journal of Hygiene*, March, 1935) states that river stretches on the Ohio, Illinois and Lower Illinois Rivers receive a heavy fresh sewage pollution. They are from 40 to 100 miles long, and the time of flow over this length is 40 to 300 hours. The occurrence of bacterial decrease is well known. The rate of decrease varies widely in different parts of the stream. Sedimentation and sunlight (direct effects) are minor factors. Along the large streams the rate varies. Temporary increase can occur immediately below sewer outlets and where two streams meet. When samples are stored, the number of bacteria temporarily increases (even fiftyfold). This occurs even when streams have a decreasing content of bacteria, thus eliminating any purely chemical effects. Experimental studies of the effects of plankton were made, and the author considers destruction is produced by predatory plankton, using living bacteria as their food supply. A biological carpet is formed, over which a highly polluted water rich in plankton food supply passes. Physical factors, such as increase of wetted area in proportion to volume, and any turbulence in the stream, favour this method of bacterial destruction. Deep sluggish channels, for example, are not so effective as broad shallow riffles, as in trickling brooks. Storage temporarily delays the establishment of these plankton wetted surfaces, and a certain time is necessary for the plankton to become adjusted.



## British Medical Association News.

THE BRITISH MEDICAL ASSOCIATION HOUSE,  
SYDNEY.

A PLAQUE presented by the Royal Institute of British Architects was unveiled at the British Medical Association House, 135, Macquarie Street, Sydney, on May 23, 1935, by Sir Alfred Parker, Lord Mayor of Sydney.

Dr. A. M. Davidson, the President of the New South Wales Branch of the British Medical Association, occupied the chair. With him were the Lord Mayor of Sydney, Sir Alfred Parker, Mr. A. W. Anderson, President of the Institute of Architects, members of the Council of the New South Wales Branch of the British Medical Association and past members of the Council who were associated with the erection of the building, and also members of the Institute of Architects of New South Wales.

Dr. Davidson stated that they were met to do honour to a noble building and also to those who designed and constructed it. It was with much pleasure that he welcomed the Lord Mayor, who had kindly consented to unveil the plaque, and also the President and members of the Institute of Architects, the consulting engineers, and those who were responsible for the construction of the building. He regretted the absence of Professor L. Wilkinson, F.R.I.B.A., who was out of the State and whose advice in connexion with the competition for designs had been so valuable. He understood that the ceremony was unique, inasmuch as British Medical Association House was the first building in the State to be so honoured.

He was very pleased to welcome the members of another profession, architecture, which, like that of medicine, was concerned with the well-being of the State. In these materialistic days it was the duty of every professional man to exercise particular care to live up to his professional ideals and not merely sell his professional skill. The changes of recent years had increased the responsibilities of professional men.

Architecture had been one of the greatest professions since the earliest times. Medicine owed a debt of gratitude to architects, as many ancient buildings had preserved a wealth of historical detail of great interest to medical men. The mural decorations of temples showed that the Egyptians had a knowledge of anatomy, though their physiology was somewhat defective.

The ceremony marked an historic occasion for architecture in New South Wales. A pleasant feature was that it showed a definite advance in the encouragement of good design and faultless execution. The building combined the two qualities of utility and beauty.

He desired to express the gratitude of the Association to the architects and builders, and also to pay a tribute

to those members of the Council who in the past conceived the idea of erecting such a beautiful building. The Association could look forward to the future with confidence, as the building was now a financial success.

Dr. Davidson explained that the gold medal of the Royal Institute of British Architects, which accompanied the plaque, had been awarded to Mr. Kenneth McConnel, of the firm of Fowell and McConnel.

Mr. A. W. Anderson, President of the Institute of Architects, stated that he was very interested in Dr. Davidson's reference to the association of medicine and architecture. The architects were trying to preserve some of Sydney's historical buildings. Regarding the medal, the Royal Institute of British Architects, the foremost body of its kind in the Empire and probably in the world, with a view to encouraging excellence in design, had adopted the practice of awarding a medal to the building the design of which was of sufficient merit.

The conditions of the award were: (a) the building must front a street, road, square, or court to which the public had access; (b) the architect whose name was submitted must himself be the designer of the building.

The medal was first presented in London in 1922. In 1927 the Royal Institute agreed to award an R.I.B.A. medal for buildings in New Zealand, and in 1932 for buildings in Western Australia.

The request of the New South Wales Chapter of the Australian Institute of Architects to the Royal Institute to make an award of the medal in New South Wales was acceded to.

The conditions of the award were as previously stated for the R.I.B.A. medal. Any member of the local body could nominate any building, but the jury by whom the award was made could go outside the nominations, and the first award for the years 1930-1933 was made to the British Medical Association building. The award would be a triennial one.

On behalf of his profession he would like to thank the New South Wales Branch of the British Medical Association for allowing the plaque to be attached to the building. Architects felt that they had a great responsibility in building and maintaining a city which should be a cause of pride to its citizens. The psychological effect of good architecture was not properly appreciated. The psychology of beauty was difficult to define, but its effects were far-reaching. Buildings should be beautiful as well as being utilitarian. To quote Ruskin, they had "to design in beauty and build in truth". The bugbear of architects was pounds, shillings and pence. The people who designed the pyramids probably did not have to worry about expense. An interesting fact was that it was only within quite recent times that architects were permitted to use steel and reinforced concrete in building construction.

The changing use of materials was giving architects something to think about. Old styles were passing away. Architects had yet to evolve a suitable style for the tall



Reproduction of Royal Institute of British Architects' Plaque.

buildings of today. On behalf of the Institute of Architects he desired to congratulate the architects, the builders and consulting engineers and all concerned in the erection of the building, and also the New South Wales Branch of the British Medical Association in being the possessor of such a beautiful house.

Sir Alfred L. Parker, the Lord Mayor, said that at the outset he would like to congratulate everybody who had anything to do with the erection of such a beautiful building, and also the Association on its possession of it. There was not a handsomer building in Sydney.

During the past year he had been interviewed by many architects in regard to buildings in Martin Place, but no agreement had been reached in regard to their design. The fact that the British Medical Association building had been awarded the medal of the Royal Institute of British Architects would certainly attract the passer-by. Sydney was improved and beautified by the erection of such a building.

The Lord Mayor then, in the name of the citizens of the City of Sydney, unveiled the plaque, which is placed in the entrance vestibule just above the bronze plate bearing the names of the architects, builders and consulting engineers.

#### SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Royal Melbourne Hospital on May 15, 1935. The meeting took the form of a demonstration by members of the honorary staff. Part of the report of this meeting has appeared in the issue of June 8, 1935.

##### Post-Traumatic Cerebral Thrombosis.

Dr. H. F. MAUDSLEY presented a man, aged forty-two years, who, in March, 1934, whilst working as a wharf labourer, was struck over the right temporal region by a swinging derrick. He was dazed, but managed to return to his home. He was working during the next eight days in an apparently normal manner. Then he was found in a state of semi-stupor with a right-sided hemiplegia. He was admitted to hospital and it was noted that some dilatation of the right pupil was present. After a few days the hemiplegia cleared up and he became alert mentally. On routine examination it was established that a complete right homonymous hemianopia was present. Dr. Maudsley pointed out that this had persisted, though all the other abnormal neurological signs had disappeared. X ray investigation and the usual serological tests had been carried out with negative findings.

Dr. Maudsley discussed two special problems arising out of this case: The importance, from the point of view of compensation, of arriving at a decision concerning the aetiological bearing of the original head injury on the present disability; and, if it was due to trauma, the sequence of events which would explain the disability. He thought that the latent period in the clinical history could be explained by a *contrecoup* contusion in the posterior limb of the internal capsule, with a gradually increasing oedema bringing about a local thrombosis. The spread of oedema into the adjacent limbs of the capsule, which eventually became absorbed, would explain the temporary hemiplegia, the main thrombotic lesion remaining as a permanency and accounting for the present hemianopia.

##### A Perplexing Neurological Condition.

Dr. Maudsley presented a young man, aged nineteen years, whose illness had taken a bewildering course. He was admitted to hospital on July 30, 1934, with the following history. Ten months previously he became paralysed in the left side and the paralysis was associated with headache and vomiting. This condition cleared up gradually over a period of six months, but, four months before admission to hospital, he developed lethargy with headache, head noises and deafness, dimness of vision and weakness of both sides of the body.

It was found after his admission to hospital that he had diplopia to the left on prolonged gaze, and nystagmus in all directions. The results of investigation of the visual fields were unreliable. There was asymmetry of the lower portion of the left side of the face, and impairment of the left side on shrugging the shoulders. A watch was not heard to the left side, and the uvula and tongue were deviated to the right. Tone was slightly increased on the left side. On the left the deep reflexes were greater than on the right, but the superficial reflexes were greater on the right side. The Babinski plantar reaction was elicited bilaterally. Bilateral patellar clonus and left ankle clonus were present. Sensation was everywhere normal, except for pin prick, which was variable, though the responses were exaggerated. Mentally, at first, he was loquacious and everything appeared to be a great joke. Specimens of his blood and cerebro-spinal fluid were tested, but failed to yield the Wassermann reaction. The cerebro-spinal fluid contained a trace of globulin, four lymphocytes and eight red cells per cubic millimetre, and the colloidal gold curve was of the "negative" type. The orbital fundi were of normal appearance.

The condition progressed while the patient was under observation. The signs slowly changed. Nystagmus and the Babinski response disappeared. The mental condition became very depressed and at this stage he would not talk. Then definite left internal rectus and facial paralysis developed. The cerebro-spinal fluid contained an increase in globulin, seven lymphocytes and twenty-four red cells per cubic millimetre, and the colloidal gold test gave a luetic curve. There was some apparent wasting of the right leg. He was given a course of typhoid, paratyphoid A and B vaccine injections and the signs again gradually cleared up, but he remained morose and lethargic. He was discharged to the Receiving House at Royal Park on December 14, 1934.

At the time of the meeting the patient's mental condition had become one of exaltation and, though in repose he was quiet, he was quite willing to speak, maintaining that he was a champion at all forms of sport. The patient's mental history and his present mental state were suggestive of *dementia præcox*. This diagnosis, however, was negated by the neurological onset and subsequent findings. Although the neurological signs had nearly subsided, there remained a horizontal nystagmus and the absence of the left superficial abdominal reflexes. Dr. Maudsley thought that the patient might have had an encephalitis, of which his present condition was a sequela, but the more probable explanation was that it was an atypical case of disseminated sclerosis.

During the discussion Dr. C. Farran-Ridge pointed out that Kraepelin had described cases of disseminated sclerosis in which mental exaltation was present as a phase of the disease.

##### Hæmatomyelia.

Dr. Maudsley also showed a male patient, aged fifty-four years, who was admitted to hospital on October 18, 1934. On the previous day he had been lying in the park and, on attempting to rise, found that his legs and his arms were weak. He was not a heavy drinker, but had had nothing to eat for two days.

Examination showed complete paralysis of arms and legs, jerks increased on the right side, with some spasticity, stocking and glove anaesthesia of the hands and feet, and, bilaterally, the Babinski type of plantar reflex. Retention of urine was present. The blood and cerebro-spinal fluid did not give the Wassermann reaction, and the colloidal gold test gave no reaction. There was not any excess of globulin in the cerebro-spinal fluid, which contained two lymphocytes, one large mononuclear, one polymorphonuclear leucocyte, and 128 red cells per cubic millimetre. The Casoni intradermal skin test for hydatid disease gave no reaction, and the skiagram of the spine did not show any evidence of disease. Throughout, the patient complained of cramps and pain suggesting root distribution in the legs, abdomen and arms. His bladder was catheterized for some days, and then gradually he regained control of micturition. Spasticity of the lower



limbs developed and he had definite flexor spasms on the slightest of stimuli. He had had variable sensory changes, which had improved. He had had a band of hyperaesthesia just below the umbilicus. Power gradually returned to the limbs and he could get about with the aid of crutches, but the long flexor muscles and the small muscles of the hand became paralysed with wasting, and he still had occasional flexor spasms of the lower limbs.

Dr. Maudsley considered that the diagnosis in this case rested between a hæmatomyelia and an inflammatory process. The sudden onset suggested hæmatomyelia with an effusion of blood down the central canal of the cord, with formation of a clot in the lower thoracic region. The residual lower motor neurone paralysis of some of the small muscles of the right hand was suggestive of an invasion of some of the anterior horn cells in the cervical region. This would be likely to occur in a central lesion of the cord. The root pains, however, gave colour to the view that an inflammatory condition might have been present.

#### Intravenous Pyelography.

Dr. J. THOMSON TAIT presented a series of case histories illustrating the uses and the disadvantages of the intravenous method of pyelography. In two out of four examples of renal tumour the diagnosis had been made from filling defects shown in pyelograms obtained after cystoscopy and ureteral catheterization. In the next case pyelography by the intravenous method had been used to test the opposite kidney, which was shown to be normal in function and in outline. The fourth instance was one in which no definite diagnosis could be made from the pyelogram obtained by the use of "Uroselectan", while retrograde pyelography showed an outline which was characteristic of a cyst of the kidney. This condition was found to be present at the subsequent operation.

In a short summary Dr. Tait said that, as far as these cases were concerned, intravenous pyelography was useful as a means of making certain that the opposite kidney was healthy after a diagnosis had been made by the older method. Its disadvantage as a diagnostic measure was the uncertainty of getting a sufficiently sharp outline to say that a filling defect was present.

Dr. Tait then showed the skiagrams of a patient in whom a series of intravenous pyelograms demonstrated an irregular dilatation of the renal pelvis on one side. It was pointed out that from this evidence no reliable opinion could be given upon pathology or treatment. A complete ureterogram and pyelogram had been obtained by the passage of a ureteric catheter, and this demonstrated an extensive narrowing and kinking of the ureter, with definite hydronephrosis, which had necessitated nephrectomy.

In the last two patients, both of whom gave a history of having passed stones, it had been found impossible to introduce a ureteric catheter beyond a certain point in the ureter of one side and, on injecting opaque fluid, no pyelogram or shadow had been demonstrated in the renal area of the affected side. The dye test had given results corresponding to the absence of function, and it was discussed whether the negative evidence of pyelography by the intravenous method was sufficient to warrant an operation which might include nephrectomy.

#### Permanent Suprapubic Drainage.

Dr. HAROLD MOORE showed apparatus illustrating some of the methods of suprapubic drainage. In particular he pointed out the value of the large flanged tube, generally used at the Royal Melbourne Hospital. It was not possible for a patient to reinsert this type of tube for himself. Dr. Moore regarded it as the most suitable for those who could attend periodically at the hospital. He referred to several points in the management of these cases, including the advisability of keeping the tube clipped off for as long as possible, both day and night, to maintain the bladder capacity.

Tubes similar to those used at Saint Peter's, in London, and at the Alfred Hospital, Melbourne, were also demonstrated. In contrast to the type already mentioned, these

tubes could be taken out, boiled and reinserted by the patient. They were, however, a little more liable to leak.

Dr. Moore presented some patients to illustrate the use of these tubes in the management of carcinoma of the prostate, stricture of the urethra associated with prostatic obstruction and gross urinary infection in a diabetic, and an unusual condition which was at first thought to be an example of carcinoma of the prostate. The patient in the last-mentioned case had an inflammatory condition of the prostate and multiple perineal fistulae associated with a cystic condition of the bones of the pelvis.

#### Skiagrams.

Dr. HOWARD F. PRAAGST showed a number of X ray films of interest, including a series illustrating different types of gall-stones and pathological conditions of the gall-bladder; two cases of osteogenic sarcoma of the tibia and of the femur in *osteitis deformans*; syphilitic osteitis of the skull; and metastatic involvement of the bones of the pelvis from prostatic carcinoma.

#### Demonstration of Liver Preparations.

Dr. IAN WOOD and Dr. HILDA GARDNER had a room arranged with exhibits of practical interest in the treatment of patients with pernicious anaemia. The costs of liver and its modifications were indicated. The maintenance dose was assessed at half a pound of whole liver per day, or the equivalent of this amount. The cost varied greatly with the type of preparation used. Whole liver given by mouth and certain extracts for intramuscular injection were cheaper than liver or stomach extracts for oral administration. It was suggested that the most satisfactory and economical method was to give half a pound of whole liver two or three times a week, and complement this with an intramuscular injection of liver extract each month. Of course, a variation of this procedure would be necessary, as the maintenance dose required varied with different individuals.

Sister Brett, of the Dietetic Department, demonstrated the various methods of serving half a pound of liver adopted at the hospital.

The success of the régime proposed was demonstrated by Dr. Wood and by Dr. Gardner in the cases of several patients who were presented.

#### Septic Thrombosis of the Lateral Sinus.

Dr. G. C. SCANTLEBURY showed a lad of sixteen years who had developed a septic thrombosis of the lateral sinus arising from acute mastoiditis.

Eleven days before admission to hospital on February 17, 1935, the patient complained of earache and, two days later, a discharge appeared from the ear and the pain ceased. Two days before admission pain recurred, with rigors and vomiting, and he became delirious twenty-four hours before arrival at hospital. At that time his temperature was 41.1° C. (106° F.), the pulse rate 130 and the respirations 40 per minute. Extreme tenderness was present over the left mastoid region, with discharge from the ear. There was some neck stiffness and Kernig's sign was present.

A left Schwartz operation was performed immediately and septic clot was evacuated from the lateral sinus. Three days later there was an infarct in the right lung, and eight days later red blood cells were found in the urine. Later, the right side of the chest was needed and altered blood was obtained, but on several other occasions the fluid withdrawn was purulent. The empyema was cured by aspiration without thoracotomy.

As a result of the toxæmia the patient had a dilated heart, tachycardia, multiple extrasystoles, considerable mental impairment and gross emaciation. All these signs had improved greatly when the patient was presented at the meeting.

#### Epithelioma of the Pyriform Fossa.

Dr. Scantlebury's next patient, aged seventy-eight years, for three years had had soreness of the throat, becoming progressively worse. For eighteen months hoarse voice,



difficulty on swallowing and an irritable cough at night had been present. In February, 1935, it was ascertained on laryngoscopic examination that ulceration of the lateral wall of the larynx extended downwards for 3.75 centimetres, that the growth arose from the pyriform fossa, which was filled with malignant material that extended on to the ary-epiglottic fold and the epiglottis. The vocal cords were not involved. On February 27 biopsy material was found to be epitheliomatous, and on March 27 surgery of access was carried out and radium was implanted under local anaesthesia. Through a collar incision the lateral lamina of the thyroid cartilage was removed and radon needles were inserted into the prevertebral space and the lateral wall of the larynx. At the meeting it was noted that the tumour had disappeared but that the area was still oedematous.

#### Epithelioma of the Vocal Cord.

Another of Dr. Scantlebury's patients, aged forty-seven years, had been husky for six months. This symptom had become progressively worse, until he could speak in a whisper only. He had been under treatment for laryngitis during this period. Laryngoscopic examination established the presence of a nodular mass which was visible on the centre of the right vocal cord. A piece removed proved on investigation to be epitheliomatous.

On March 28, 1935, the growth was excised. The larynx was split slightly to the left of the mid-line and the right lateral lamina was removed to give access to the growth. Convalescence was uneventful, except for mild bronchitis, and the patient was discharged from hospital on April 14.

#### Cardiospasm.

Dr. Scantlebury's fourth patient was thirty-five years of age. There was a history for three years of periodic difficulty in swallowing food, associated with substernal discomfort. This difficulty was often independent of the type of food. Food, sometimes twenty-four hours old, had been regurgitated. The patient's weight had decreased by 13.5 kilograms (thirty pounds) in the last year.

On admission on April 9, 1935, the patient's weight was 46.8 kilograms (seven stone six pounds). Oesophageal lavage gave an offensive return and next day oesophagoscopy was performed. Cardiospasm was demonstrated and dilatation was carried out with the Mocher dilator. The patient was given fluid and finely divided diet and oesophageal lavage each day. Five days later the return was much cleaner, and daily passage of an oesophageal bougie was commenced. On May 1 the weight was 47.2 kilograms (seven stone seven pounds six ounces), the difficulty in swallowing was no longer evident, and normal diet was commenced. Plummer's bag was passed on alternate days. By May 14 there was general improvement and the weight had advanced to 49.0 kilograms (seven stone eleven pounds).

#### Epithelioma of the Tongue.

DR. CLIVE M. EADIE presented a patient, aged sixty-one years, who admitted syphilitic infection thirty-five years previously, though the blood, when he was first seen, failed to yield the Wassermann reaction. For two years before he was first seen at hospital in 1933 he had complained of sore tongue, and several leucoplakial patches were present on the dorsum and a small ulcerated area posteriorly. This ulcer healed in two months under treatment with mouth washes, but recurred in February, 1934. The patient failed to report again until the following December. A papilloma found on the region of the old ulcer was removed by diathermy. Since February, 1935, there had developed pain on swallowing and talking, a husky voice and an irritable cough. At the time of the meeting the tongue protruded to the right, the larynx was of normal appearance, and no glands were palpable, but there was a hard infiltrated area posteriorly, to the right of the base of the tongue, with central ulceration. The mass had the clinical appearance of an epithelioma, but a report on the examination of biopsy material had not been completed.

#### Sinus Infection.

Dr. Eadie's second patient was a man of forty-five years, who was admitted to hospital three months earlier with bronchopneumonia. One week later he developed subcutaneous abscesses in the right deltoid region and in the left thigh. Convalescence was very slow, and profuse sputum had continued to be present. On several occasions tubercle bacilli had been searched for without success. Two weeks before the meeting chronic suppurative maxillary sinusitis was proved to be present by puncture. Since then material improvement in the general condition had been obtained as a result of repeated washing out of the antrum.

#### NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

- Corlette, Noel Adair Christian, M.B., B.S., 1931 (Univ. Sydney), 33, Wolseley Road, Point Piper.  
Deacon, John Leslie, M.B., B.S., 1933 (Univ. Sydney), Newcastle Hospital, Newcastle.  
Thom, Edith Marjorie, M.R.C.S. (England), L.R.C.P. (London), 1918, 2, St. Noets Avenue, Potts Point.  
Ward, Hugh Kingsley, M.B., 1910 (Univ. Sydney), Camperdown.  
Woolford, Hartwell Bert, M.B., B.S., 1933 (Univ. Sydney), Newcastle Hospital, Newcastle.

#### Medical Practice.

##### THE ADELAIDE RADIOTHERAPY CLINIC.

THE following is a circular issued from the Radiotherapy Clinic at the Adelaide Hospital; it bears the date June, 1935.

#### Introduction.

The Radiotherapy Clinic at the Adelaide Hospital came into existence in 1929. It is composed of members of the honorary medical staff representing different departments of hospital work, appointment to the clinic being made by the honorary staff. In general the functions of the clinic are to assist the honorary radiotherapists in the choice of treatment and to assess the value of the results obtained. The care of case records and the collation of statistical material is undertaken by a clerical staff with a whole-time radiotherapeutic registrar.

It is therefore six years since the clinic was inaugurated, and in this time just over 3,000 patients suffering from various diseases have been referred to it by members of the honorary staff. It is too early to consider any valuable number of "results" in the generally accepted sense of the term, but the numbers have been great enough to make some of the impressions obtained worthy of practical application. Technique and treatment plans have been approved or varied from time to time in the light of experience.

For some years past it has been customary to hold quarterly evening meetings of the clinic. At each such meeting some particular phase of cancer treatment is discussed, one member presenting a *résumé* of recent literature pertaining to the subject. Our own techniques and tentative results may then be compared with those obtaining in other centres, and plans laid down for future guidance.

All our members agree that they derive benefit from these discussions, and it was suggested that other practitioners might also be interested to learn what is being done in Adelaide and the reasons for our actions. It is realized that many medical practitioners have neither the time

nor perhaps the facilities for reviewing the literature about cancer in its various types and sites. It was decided, therefore, to print the proceedings of some of these evening meetings from time to time and to circulate them among the doctors in South Australia.

### Cancer of the Breast.

#### Recent Literature.

On February 19, 1935, the radium clinic discussed cancer of the breast. The *résumé* of the literature on the subject for that evening showed the following points.

1. In early cases surgical treatment is still the treatment of choice, provided that a radical operation is efficiently carried out. Lane Claypon found that three-year cures totalled 33.9% of 20,000 cases investigated. The percentage was much higher, nearly 80%, when only Stage I was considered. Graphs prepared by Pfahler in America showed the advantage of the complete over incomplete amputation, the survival rate after the latter operation being very little better than the survival rate in untreated cancer of the breast. Adair, in America, classes as inoperable any case in which the upper axillary glands are involved.

2. Radium treatment can cure cancer of the breast in an appreciable number of cases, but its usefulness is largely limited to those cases in which operation is practicable. It may be used advantageously to assist operation by irradiating, for example, the internal mammary glands and the apex of the axilla after dissection.

3. X ray treatment can cure cancer of the breast, as has been shown in Germany by Wintz, who analysed 97 patients in Stages I and II so treated and found 55.4% alive and well after five to six years. When Stage I only was considered, the results were very much better. It is most widely used, however, as an adjuvant to surgery.

**Post-Operative X Ray Treatment.**—J. H. Douglas Webster, in England, analysed 358 cases and found that the operation cure rate can be doubled by the use of a post-operative X ray treatment. From the Bier surgical clinic in Germany comes a report of 839 cases of cancer of the breast treated by a standardized radical operation. One hundred and eighty-three of these received additional post-operative X ray treatment and showed a five-year cure rate of 53%. The remainder, 656, had the radical operation without X rays and gave 30.1% five-year cures.

**Pre-Operative X Ray Treatment.**—In the early days of deep X ray therapy pre-operative irradiation was almost entirely confined to inoperable cases. In some of these patients it was found that infiltration round the tumour subsided to an extent which permitted the subsequent performance of a radical amputation. In consequence of this, in overseas clinics early cases of cancer of the breast have been more and more referred for pre-operative X ray therapy. The immediate results of this combination of radiation and surgical treatment have been encouraging, particularly when followed with post-operative X ray therapy. Many radiologists are asking for more early material in order that this combined plan of treatment, in which excision is still the main factor, may have a satisfactory trial. The interval between X ray treatment and operation recommended in the several clinics varies from ten days to six weeks.

Inoperable cases are variously treated by means of radium or high voltage X rays, as are many patients showing secondary deposits.

#### Present Procedure at the Adelaide Hospital.

During the past five years most, though not all, operations for cancer of the breast have been followed by a course of high voltage X ray therapy. The numbers are too small for a statistical analysis, but the patients receiving post-operative X ray treatment show a somewhat better response than those without post-operative irradiation. Several inoperable tumours became operable after first receiving X ray therapy. One operable case had a biopsy which showed the presence of a duct carcinoma; the patient received pre-operative X ray treatment and then, when the breast was removed several months later, Dr. Bull was unable to identify any cancer cells. One breast, the site

of acute carcinoma, was removed five months after deep therapy and showed that the majority of cancer cells remained, and these were still dying off, as was evidenced by the pale "ghosts" of nuclei which could be identified here and there.

It was decided to continue to recommend radical operation whenever this is feasible, but to recommend that in every case of cancer of the breast treated surgically deep therapy should be included.

The surgical section of the honorary staff has been asked through the Chairman to coöperate in the trial of pre-operative X ray therapy by providing some early material. An occasional case will be treated with radium. This method has presented difficulties in the past due to our inadequate supply of suitable long needles, but recent arrangements with the Commonwealth Department of Health will remedy this deficiency.

Inoperable cancers of the breast will usually be treated by means of X rays alone, some by means of radium implantation.

Metastases to bone from cancer of the breast have proved sensitive, and we have found that relief from pain and some improvement in function will result from X ray therapy in almost 100% of such cases. Worthwhile palliation in the healing of an ulcer can be obtained in most cases in which the tumour has fungated through the skin. Skin nodules are often, but not always, resistant to X rays, particularly when they have coalesced to form *cancer en cuirasse*. Subcutaneous deposits and secondary deposits in glands usually respond well.

Members of the clinic have been impressed with the somewhat large proportion of patients arriving at the clinic with an undoubted cancer of the breast who have stated that a year or more previously they were told by a medical practitioner that the lump was negligible. The growing emphasis in the literature on the difficulty of diagnosis between a pure chronic mastitis and one that is complicated with an early cancer leads members of the clinic to suggest that no case of a lump in the breast should be lightly dismissed without treatment unless a biopsy has been performed or a consultation held. In this connexion the suggestion made a few years back, that all practitioners, as part of their routine examination of middle-aged women, should palpate the breast for a "silent" tumour, might, if followed, lead to the discovery of more cases in early stages.

## Post-Graduate Work.

### WEEK-END POST-GRADUATE COURSE AT LISMORE.

THE New South Wales Permanent Post-Graduate Committee announces that a week-end post-graduate course will be held at Lismore on Saturday, August 10, and Sunday, August 11, 1935, following the annual general meeting of the North-Eastern Medical Association.

The programme will be announced later. The fee for the course is one guinea. Members intending to be present are requested to communicate as soon as possible with Dr. J. R. Ryan, Lismore.

## Correspondence.

JAMES COLLIER.

SIR: In common with almost every medical graduate who has attended British clinics, may I be permitted to pay a small tribute on behalf of very many of us to the memory of Dr. James Collier, who died yesterday at his home in Wimpole Street, London.

There never has been, nor will there ever be again, a physician such as James Collier. For most medical residents of and visitors to London, his lecture-demonstrations at Saint George's and Queen's Square Hospitals were truly memorable events. This extraordinarily vital person (for Collier was a kind of medical Lloyd George—large-headed, frill-framed, gesticulating, rotating and yet at all times dignified) would hold large audiences breathless with attention while he extracted mathematically exact and often most recondite diagnoses from a selection of the rarest and most interesting neurological cases in London.

With all the dexterity and the abandon of a conjurer, Collier would make a zig-zag path across the array of cases and, to the fascination of his audience, make his diagnoses in a way which resembled very closely that of a magician extracting objects from a hat.

Collier's learning was both immense and unique. The best of it is to be found in his by no means voluminous writings, but much of it, alas, must perish. Few of those who witnessed it are likely to forget the occasion when this learned and remarkable physician produced, with his invariably consummate courtesy, an operatic tenor at his lectures and requested him to sing a few bars. The man, a local Caruso, began with an apologetic doh-ray-me, but was stopped almost instantly by Collier, who, after a few stabbing sentences to the front line of his listeners, then exclaimed, with characteristic explosiveness, that the singer's voice was typical and the diagnosis certain: "Yes, gentlemen, our friend has syringomyelia and"—here Collier gave one of his deep expiratory hisses—"it is affecting his laryngeal centres!" James Collier was the personification of frankness, gentleness, lucidity, humour and learning. A typical product of conventional British medicine at its best, his staccato utterance, deep respiratory hisses, quick gestures, sudden concentrations, and his always charming bursts of candour combined to create an inoffensively, unconventional and always striking personality.

The writer is not without confidence that many of his contemporaries will be glad that someone has dedicated these few lines from London.

Yours, etc.,

JOHN GODSALL.

London, W.2,  
February 13, 1935.

#### COLOUR BLINDNESS AND TONE DEAFNESS.

SIR: I desire to correct a misstatement of Dr. G. H. Taylor's findings on the above subject in an article on mental hygiene in the journal of April 6, by Dr. Harvey Sutton, on page 420, and a letter on colour blindness and tone deafness, May 4, page 571, by Dr. Eric Pockley.

Dr. G. H. Taylor, with whom I worked for many years on the subject before our retirement from the Railways Medical Service, writes me as follows:

I did not say that colour blind persons were never found to be tone deaf, but that I had never found the two defects in one person. In over 100 cases of tone deafness I found them colour normal, but with a quality of voice which suggested to me, prior to examination, a condition of colour blindness. I still think it is difficult to distinguish between the two defects by the voice alone. You may remember the case of E.M.R. I did not say that the tone deaf has more modulation; I said that the tone deaf has a quality of modulation. I should have added occasionally. I examined recently a rare case of colour blindness and tone deafness in a girl. Her mother is a tone deaf, her mother's father a tone deaf, her paternal grandfather was colour blind; patient's intelligence rather below normal, but well up to average in arithmetic; voice and expression what you would expect.

Yours, etc.,

BASIL FOULDS.

Binalong,  
New South Wales,  
May 31, 1935.

#### AN ACKNOWLEDGEMENT.

SIR: In the obituary notice of May 18, 1935, in THE MEDICAL JOURNAL OF AUSTRALIA concerning Sir Richard Stawell, an omission occurred in not acknowledging the source of the photograph. Several months ago Dr. Julian Smith photographed Sir Richard in characteristic pose, and he was kind enough to supply me with a print, which was so admirably reproduced in the journal.

Yours, etc.,

A. E. ROWDEN WHITE.

85, Spring Street,  
Melbourne, C.1,  
June 8, 1935.

#### University Intelligence.

##### THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on May 13, 1935.

The following degree was conferred *in absentia*:

Bachelor of Surgery: Wilson Leighton Corlis, M.B.

A gift of £10 10s. for the purchase of reference books for the Department of Chemistry was accepted with grateful thanks from Messrs. W. D. and H. O. Wills (Australia), Limited.

The Consul-General for Czechoslovakia forwarded a collection of seventy books from Czechoslovakian universities as a gift to the Fisher Library. This gift was accepted with thanks.

The following appointments were approved: Dr. R. A. M. Allen as Tutor in Anaesthetics at Sydney Hospital; Dr. A. W. Morrow as Tutor in Medicine at Royal Prince Alfred Hospital; Dr. A. J. H. Stobo and Dr. K. B. Noad as Tutors in Medicine at Sydney Hospital.

The General Secretary of the Graziers' Association of New South Wales forwarded the following resolution passed by his Association:

That upon the twenty-fifth anniversary of the Sydney University Veterinary School, a vote of appreciation be conveyed to the school upon the good work which has been accomplished.

On the recommendation of the Faculty of Medicine it was resolved that the examination in pharmacology be held at the beginning of the third term of the fourth year instead of at the end of that year, as at present.

##### THE DAVID MEMORIAL.

AFTER the death of Professor Sir Tannatt William Edgeworth David a meeting was called to consider what steps might be taken to honour his memory. The gathering was representative of all sections of the community. The following resolution was adopted:

In view of the great work done by Sir Edgeworth David for the science of geology and in view of the outstanding importance of his teaching, research, and contributions to geological knowledge as the first Professor of Geology in the University of Sydney, the Committee resolves: (1) that a fund to be known as the David Memorial Fund be raised, that it be handed over to the University of Sydney, and that the income from it be applied in such manner as the Senate thinks will best aid in the advancement of the science of geology; and (2) that the Senate be requested to associate the name of Sir Edgeworth David permanently with the Chair of Geology.

Dr. R. J. Noble is Chairman and Dr. A. B. Walkom is Honorary Secretary of the Committee appointed by the meeting to direct the collection of the fund. It is thought that many medical practitioners throughout the Common-



wealth may wish to be associated with this memorial. Subscriptions may be forwarded to the Honorary Treasurers, David Memorial Fund, Science House, Gloucester Street, Sydney.

### Obituary.

#### ROBERT HENRY PULLEINE.

We regret to announce the death of Dr. Robert Henry Pulleine, which occurred at Adelaide on June 13, 1935.

#### JOHN HENRY RAYMOND McCUTCHEON.

We regret to announce the death of Dr. John Henry Raymond McCutcheon, which occurred at Croydon, New South Wales, on June 14, 1935.

#### ROGER ROBERT STEEL McKINNON.

We regret to announce the death of Dr. Roger Robert Steel McKinnon, which occurred on June 14, 1935, at Mosman, New South Wales.

#### THE GEORGE MACDONALD TESTIMONIAL FUND.

THE undermentioned subscriptions have been received for the George Macdonald Testimonial Fund:

£2 2s.: Dr. S. H. Lovell.

£1 1s.: Dr. Norman Sherwood, Dr. E. H. M. Stephen, Dr. A. W. Holmes & Court.

### Diary for the Month.

JUNE 25.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
JUNE 27.—South Australian Branch, B.M.A.: Branch.  
JUNE 27.—New South Wales Branch, B.M.A.: Branch.  
JUNE 28.—Queensland Branch, B.M.A.: Council.  
JULY 1.—New South Wales Branch, B.M.A.: Organization and Science Committee.  
JULY 2.—Tasmanian Branch, B.M.A.: Council.  
JULY 2.—New South Wales Branch, B.M.A.: Council (quarterly).  
JULY 3.—Western Australian Branch, B.M.A.: Council.  
JULY 3.—Victorian Branch, B.M.A.: Branch.

### Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xiii, xiv, xv.

ALFRED HOSPITAL, MELBOURNE, VICTORIA: Honorary Officers.  
AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Resident Medical Officer and Pathologist, Resident Medical Officer.  
DEPARTMENT OF THE INTERIOR, CANBERRA, FEDERAL CAPITAL TERRITORY: Medical Officer.  
LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer.  
MENTAL HOSPITAL, NEW NORFOLK, TASMANIA: Junior Medical Officer.  
MOUNT ISA MINES, LIMITED, MOUNT ISA, QUEENSLAND: Chief Medical Officer.  
RENWICK HOSPITAL FOR INFANTS, SUMMER HILL, NEW SOUTH WALES: Honorary Anaesthetist.  
THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officers.  
VICTORIAN EYE AND EAR HOSPITAL, MELBOURNE, VICTORIA: Resident Surgeons, Post-Graduates.

### Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmalm United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointment and those desiring to accept appointments to any COUNTRY HOSPITAL, are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	Office of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

### Editorial Notices.

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